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PART B

SOLAR - GEOPHYSICAL DATA

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U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
CENTRAL RADIO PROPAGATION LABORATORY
BOULDER, COLORADO

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PART B

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INTRODUCTION

This monthly report series is intended to keep research workers abreast of the major particulars of solar activity and the associated ionospheric, radio propagation and other geophysical effects. It is made possible through the cooperation of many observatories, laboratories and agencies as recorded in the detailed description of the tables and graphs which follows. The report is prepared in the Radio Warning Services Section, edited by Miss J.V. Lincoln.

I DAILY SOLAR INDICES

Relative Sunspot Numbers -- The table includes (1) the daily American relative sunspot numbers, R_A', as compiled by the Solar Division of the American Association of Variable Star Observers, and (2) the provisional daily Zürich relative sunspot numbers, R_Z, as communicated by the Swiss Federal Observatory. Because of the time required to collect and reduce the observations, R_A' will normally appear one month later than R_Z.

The relative sunspot number is an index of the activity of the entire visible disk. It is determined each day without reference to preceding days. Each isolated cluster of sunspots is termed a sunspot group and it may consist of one or a large number of distinct spots whose size can range from 10 or more square degrees of the solar surface down to the limit of resolution (e.g. 1/8 square degrees). The relative sunspot number is defined as $R=K(10g+s)$, where g is the number of sunspot groups and s is the total number of distinct spots. The scale factor K (usually less than unity) depends on the observer and is intended to effect the conversion to the scale originated by Wolf. The observations for sunspot numbers are made by a rather small group of extraordinarily faithful observers, many of them amateurs, each with many years of experience. The counts are made visually with small, suitably protected telescopes.

Final values of R_Z appear in the IAU Quarterly Bulletin on Solar Activity, the Journal of Geophysical Research, these reports, and elsewhere. They usually differ slightly from the provisional values. The American numbers, R_A', are not revised.

Solar Flux Values, 2800 Mc -- The table also lists the daily values of solar flux at 2800 Mc recorded in watts/M^2/cycle/second bandwidth ($\times 10^{-22}$) in two polarizations by the National Research Council at Ottawa, Canada. These solar radio noise indices are being published in accordance with CCIR Report 25 that a basic solar index for ionospheric propagation should be measured objectively and "preferably refer to a property of the sun such as radiation flux which has direct physical relationship to the ionosphere."

Graph of Sunspot Cycle -- The graph illustrates the recent trend of Cycle 19 of the 11-year sunspot cycle and some predictions of the future level of activity. The customary "12-month" smoothed index, R, is used throughout, the data being final R_Z numbers except for the current year. Predictions shown are those made for one year after the latest available datum by the method of A. G. McNish and J. V. Lincoln (Trans. Am. Geophys. Union, 30, 673-685, 1949) modified by the use of regression coefficients and mean cycle values recomputed for Cycles 8 through 18. Cycle 19 began April 1954, when the minimum $\bar{R}$ of 3.4 was reached.

II SOLAR CENTERS OF ACTIVITY

Calcium Plage and Sunspot Regions -- The table gives particulars of the centers of activity visible on the solar disk during the preceding month. These are based on estimates made and reported on the day of observation and are therefore of limited reliability.

The table gives the heliographic coordinates of each center (taken as the calcium plage unless two or more significantly and individually active sunspot groups are included in an extended plage) in terms of the Greenwich date of passage of the sun's central meridian (CMP) and the latitude; the serial number of the plage as assigned by McMath-Hulbert Observatory; the serial number of the center in the previous solar rotation, if it is a persisting region; particulars of the plage at CMP: area, central intensity; a summary of the development of the plage during the current transit of the disk, where b = born on disk, ℓ = passed to or from invisible hemisphere, d = died on disk, and / = increasing, - = stable, \ = decreasing; and age in solar rotations; particulars of the associated sunspot group, if any, at CMP: area and spot count and the summary of development during the current disk transit, similar to the above. The unit of area is a millionth of the area of a solar hemisphere; the central intensity of calcium plages is roughly estimated on a scale of 1 = faint to 5 = very bright.

Calcium plage data are available through the cooperation of the McMath-Hulbert Observatory of the University of Michigan. The sunspot data are compiled from reports from the U. S. Naval Observatory, and from reports from Europe and Japan received through the daily Ursigram messages.

Coronal Line Emission Indices -- In the table are summarized solar coronal emission intensity indices for the green (Fe XIV at λ5303) and red (Fe X at λ6374) coronal lines. The indices are based on measurements made at 5° intervals around the periphery of the solar disk by the High Altitude Observatory at Climax, Colorado, and by Harvard University observers at Sacramento Peak (The USAF Upper Air Research Observatory at Sunspot, New Mexico, under contract AF 19(604)-146). The measurements are expressed as the number of millionths of

an Angstrom of the continuum of the center of the solar disk (at the same wavelength as the line) that would contain the same energy as the observed coronal line. The indices have the following meanings:

G_6 = mean of six highest line intensities in quadrant for $\lambda 5303$.

R_6 = same for $\lambda 6374$.

G_1 = highest value of intensity in quadrant, for $\lambda 5303$.

R_1 = same for $\lambda 6374$.

The dates given in the table correspond to the approximate time of CMP of the longitude zone represented by the indices. The actual observations were made for the North East and South East quadrants 7 days before; for the South West and North West quadrants 7 days after the CMP date given.

To obtain rough measures of the integrated emission of the entire solar disk in either of the lines, assuming the coronal changes to be small in a half solar rotation, it is satisfactory to perform the following type of summation given in example for 15 October:

$$\left(\begin{matrix}\text{MEAN DISK EMISSION}\\ \text{IN } \lambda 5303\end{matrix}\right)_{15\text{ OCT}} = \frac{1}{N}\left[\sum_{15\text{ OCT}}^{22\text{ OCT}}\left\{(G_6)_{NE}+(G_6)_{SE}\right\}+\sum_{8\text{ OCT}}^{14\text{ OCT}}\left\{(G_6)_{SW}+(G_6)_{NW}\right\}\right]$$

where N is the number of indices entering the summation.

Such integrated disk indices as well as integrated whole-sun indices are computed for each day and are published quarterly in the "Solar Activity Summary" issued by the High Altitude Observatory at Boulder, Colorado. In the same reports are given maps of the intensity distribution of coronal emission derived from all available Climax and Sacramento Peak observations, as well as other information on solar activity, such as maps made from daily limb prominence surveys in Hα and notes regarding the history of active regions on the solar disk.

Preliminary summaries of solar activity, prepared on a fast schedule, are issued Friday of each week from High Altitude Observatory in conjunction with CRPL and include solar activity through the preceding day. These are useful to groups needing information on the current status of activity on the visible solar disk, but are not recommended for research uses unless such a prompt schedule of reporting is essential. The same information is included in the subsequent quarterly reports, with extensive additions, corrections and evaluations.

III SOLAR FLARES

Optical Observations -- The table presents the preliminary record of solar flares as reported to the CRPL on a rapid schedule at the sacrifice of detailed accuracy. Definitive and complete data are published later in the Quarterly Bulletin on Solar Activity, I.A.U., in various observatory publications and elsewhere. The present listing serves to identify and roughly describe the phenomena observed.

Reporting directly to the CRPL are the following observatories: McMath-Hulbert, Wendelstein, Sacramento Peak, Mitaka and Swedish Astrophysical Station on Capri. The remainder report through the URSIgram centers or are available through the IGY World Data Center for Solar Activity in Boulder. Observations are in the light of the center of the H-alpha line unless noted otherwise. The reports from Sacramento Peak, New Mexico (communicated to CRPL by the High Altitude Observatory at Boulder) are from observations at the USAF Upper Air Research Observatory at Sunspot, New Mexico, by Harvard University observers, under contract AF 19(604)-4961.

For each flare are listed the reporting observatory, the date, beginning and ending times, time of maximum phase, the heliographic coordinates in degrees, McMath serial number of the region, duration, the flare importance on the IAU scale of 1- to 3+, observing conditions where 1 means poor, 2 fair and 3 good, time of measurement for tabulated width of Hα or tabulated area, measured (i.e. projected) maximum area in square degrees, corrected maximum area in square degrees which equals measured area times secant h where h is the heliocentric angle, maximum effective line-width in Hα expressed in Angstroms, and maximum intensity of Hα expressed in per cent of the continuous spectrum. The following symbols are used in the table:

D = Greater than	F = Approximately
E = Less than	& = Plus

A final column lists provisionally the occurrence of simultaneous ionospheric effects as observed on selected field-strength recordings of distant high-frequency radio transmissions; a more nearly definitive list of these ionospheric effects, including particulars, appears in these reports after the lapse of a month (see below). All times are Universal Time (UT or GCT). Subflares (importance 1-) are listed by date, time of beginning and their heliographic coordinates. A graph presents intervals for which there were no patrols for flare observations from the observatories whose complete data are published in the table.

Ionospheric Effects -- SID, sudden ionospheric disturbances (and GID--gradual ionospheric disturbances) may be detected in a number of ways: short wave fadeouts (SWF), enhancement of low frequency atmospherics (SEA), increases in cosmic absorption (SCNA), and so forth.

A table lists SWF events that have been recognized on field-strength recordings of distant high-frequency radio transmissions. Under a coordinated program, the staffs at the following ionospheric sounding stations contribute reports that are screened and synthesized at CRPL-Boulder: Puerto Rico, Ft. Belvoir, Va., and Anchorage, Alaska (CRPL Stations: PR, BE, AN); Huancayo, Peru (CRPL-Associated Laboratory: HU); and Ft. Monmouth, N.J., White Sands, N. Mex., Adak, Alaska, and Okinawa (U.S. Signal Corps Stations: FM, WS, AD, OK). McMath-Hulbert Observatory (MC) also contributes such reports. In addition, reports are volunteered by RCA Communications Inc., Marconi Wireless, Netherlands Postal and Telecommunications Services, Swedish Telecommunications, and others; these usually specify times of SWF and the radio paths involved. Through the URSIgrams, reports are available from still other stations as given monthly in the footnotes.

In the coordinated program, the abnormal fades of field strength not obviously ascribable to other causes, are described as short wave fadeouts with the following further classification:

S-SWF:	sudden drop-out and gradual recovery
Slow S-SWF:	drop-out taking 5 to 15 minutes and gradual recovery
G-SWF:	gradual disturbance; fade irregular in either drop-out or recovery or both.

When there is agreement among the various reporting stations on the time (UT) of an event, it is accepted as a widespread phenomenon and listed in the table.

The degree of confidence in identifying the event, a subjective estimate, is reported by the stations and this is summarized in an index of certainty that the event is widespread, ranging from 1 (possible) to 5 (definite). The times given in the table for the event are from the report of a station (underlined in table) that identified it with high confidence. The criteria for the subjective importance rating assigned by each station on a scale of 1- to 3+ include amplitude of the fade, duration and confidence; greater consideration is given to reports on paths near the subsolar point in arriving at the summary importance rating given in the table.
Note: The tables of SID observed at Washington included in CRPL F-reports prior to F-135 were restricted to events classed here as S-SWF.

A second table lists sudden ionospheric disturbances which have been recognized on recorders for detecting cosmic absorption at about 18 Mc (SCNA) or on recorders for detecting enhancements of low frequency atmospherics at about 27 kc (SEA) together with solar radio bursts at 18 Mc as identified on the SCNA records.

Reports are received either directly or through the IGY World Data Center for Solar Activity at the High Altitude Observatory, Boulder, Colo. The following observatories report SCNA: Rensselaer Polytechnic Institute Observatory, Grafton, N.Y. (RE); McMath-Hulbert

Observatory (MC); Sacramento Peak, N.Mex. (SP); High Altitude Observatory, Boulder, Colo. (BO); University of Hawaii, Makapuu Pt., Hawaii (HA); and the Royal Observatory Edinburgh (ED). All of these except the Royal Observatory Edinburgh also report solar noise bursts observed at 18 Mc. The SEA reports come from the following: Department of Terrestrial Magnetism, Carnegie Institution of Washington, Station at Derwood, Md. (DE); Dunsink Observatory, Ireland (DU); Royal Observatory Edinburgh (ED); three stations operated by the Netherlands PTT at Hollandia, Dutch West Indies (HO), Nederhorst den Berg, Netherland (NE), and Paramaribo, New Guinea (PA); Panska Ves Observatory near Prague, Czech. (PU); High Altitude Observatory, Boulder, Colo. (BO); Sacramento Peak, N.Mex. (SP); McMath-Hulbert Observatory (MC); University of Hawaii (HA); Neustrelitz (NU); Kuhlungsborn (KU); and a group of American Association of Variable Star Observers located at Brooklyn, N.Y. (A1), Pittsburgh, Pa. (A2), Paterson, N.J. (A3), Powell, Ohio (A4), Ramsey, N.J. (A5), Oshkosh, Wis. (A6), China Lake, Calif. (A7), and Manhattan, Kansas (A8).

These reports are coordinated at CRPL-Boulder. When there is agreement among the various reporting stations on the time (UT) of an event, it is accepted as a widespread phenomenon and listed in the table. Some phenomena are listed, if noted at only one location, if there has been a flare or another type of flare-associated effect reported for that time.

In the table under the type of event the importance of the event is given on a scale of 1 minus to 3 plus. Next there is the index of widespread certainty ranging from 1 (possible) to 5 (definite). The time of beginning, maximum and end of the event in UT is given as reported by the station underlined in the group of observing stations. If the event is an SCNA, a percent absorption figure is given. This absorption is calculated by

$$\text{SCNA \%} = \frac{I_n - I_f}{I_n} \times 100$$

where I_n = noise diode current required to give a recorder deflection equal to that which would have occurred in the absence of a flare, i.e. a value extrapolated from cosmic noise level trend before and after a flare. The previous day's record may be considered if necessary.

and I_f = noise diode current required to give a recorder deflection equal to the level at the time of maximum absorption.

IV SOLAR RADIO WAVES

2800 Mc Observations

The data on solar radio wave events made in Ottawa, Canada by the Radio and Electrical Engineering Division of the National Research Council (A. E. Covington) at 2800 Mc (10-cm emission) are presented. Near local noon (about 1700 UT) the sensitivity of the radiometer is determined and a mean flux for the whole day calculated. These values are given in a tabular form (see table I-1) in units of 10^{-22} watts/M^2/c/s. Burst phenomena are measured above this level and are given in terms especially suitable for the variations observed on this frequency. The basis for the classifications is described by Covington - J.R. Astro. Soc. Can. 45, 49, 1951 and Dodson, Hedeman and Covington, Ap. J. 119, 541, 1954. A modification in terminology with a view to simplification has been introduced and consists essentially of the omission of the descriptive word "Single" from the "Single-Simple" and "Single-Complex" classes; in designating the "Single", "Single-Simple" and "Rise and Fall" bursts into a single classification designated as "Simple Bursts" with an appropriate type number; in the addition of the letter "f" to indicate that the burst deviates from the basic pattern by the presence of one or more small fluctuations in intensity; and by the addition of the letter "A" to indicate that the event has another smaller duration event superimposed upon it.

Simple Burst

Any single burst which rises to one maximum and then decreases to the pre-burst level.

1 - Simple 1 -- Simple burst, type 1 (formerly "single"). Bursts of intensity less than 7 1/2 flux units and duration less than 7 1/2 minutes.

2 - Simple 2 -- Simple burst, type 2 (formerly "single-simple"). Bursts of impulsive nature with intensity greater than 7 1/2 flux units.

3 - Simple 3 -- Simple burst, type 3 (formerly "rise and fall"). Bursts of moderate intensity with duration greater than 7 1/2 minutes.

4 - Post-burst increase -- Postburst level is greater than the preburst level. The gradual return to normal flux may require as long as several hours.

5 - Absorption following burst (negative post).

6 - Complex -- (formerly "single-complex"). A single burst which shows two or more comparable maxima before the activity has declined to zero.

7 - Period of irregular activity or fluctuations -- Series of overlapping bursts of moderate intensity and duration.

8 - Group -- Series of single isolated bursts occurring in succession with intensity between the events equal to the level before and after the group.

9 - Precursor -- A small increase of intensity occurring before a larger increase.

Great Burst

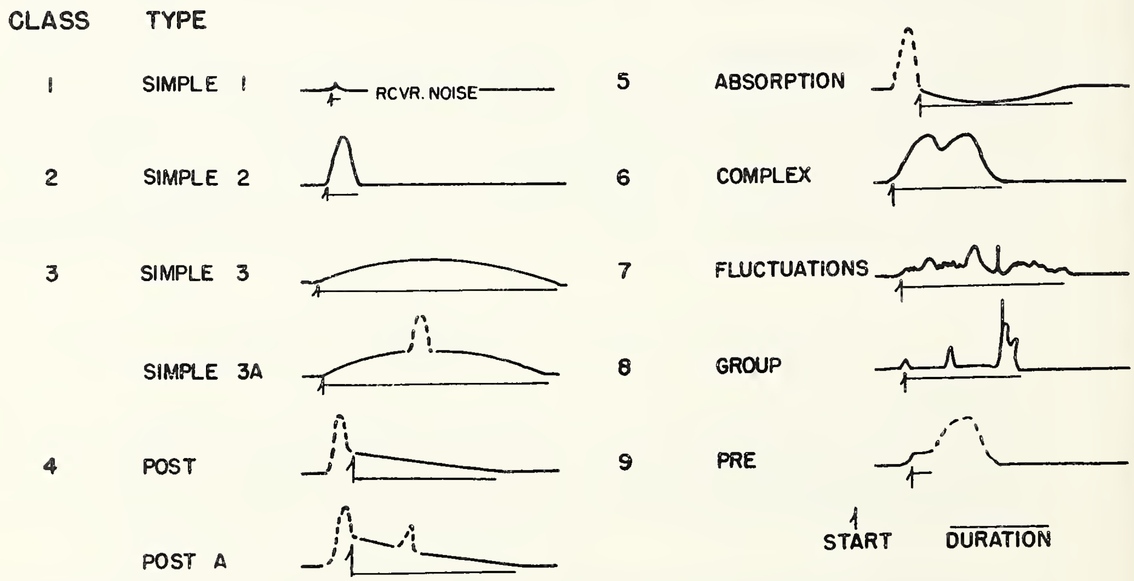
Infrequently occurring bursts of great intensity, often of complicated structure.

Letter "A"

Indicates that this event has another event superimposed upon it.

Letter "f"

Indicates that the basic form of the event is modified by secondary fluctuations.



200 Mc Observations

Data on solar radio emission on 200 Mc recorded by the University of Hawaii (I. Miyake) at Makapuu Pt., Hawaii, are presented. The outstanding occurrences are reported as described under 170 Mc Observations with the exception that no intensity measurements are given.

170 Mc Observations

Data on solar radio emission at the nominal frequency of 170 Mc recorded at the Gunbarrel Hill (Boulder) station of the National Bureau of Standards (C.G. Little) are presented. The half width of the antenna lobe is appreciably greater than the solar disk. Polarization is not determined, but the dipole is oriented E-W. All times are in Universal Time (UT or GCT). Observations are interrupted during the period from 26 to 29 minutes after each hour for calibrations.

Beginning January 1, 1959 the method of reducing the records has been changed. The 3-hourly and daily flux density and variability are no longer determined. The outstanding occurrences are reported. However, instead of giving the intensity to the nearest unit of 10^{-22} watts meter^{-2}(c/s)$^{-1}$, a scale of 1 to 3 is now used where for the estimate of smoothed maximum flux:

1 signifies $<100 \times 10^{-22}$ wm^{-2}(c/s)$^{-1}$

2 signifies >100 $<1000 \times 10^{-22}$ wm^{-2}(c/s)$^{-1}$

3 signifies $>1000 \times 10^{-22}$ wm^{-2}(c/s)$^{-1}$.

Starting and maximum times are read to the nearest 1/10 minute if they are very definite and otherwise to the nearest minute. If the duration is less than five minutes, it is given to the nearest 1/10 minute; otherwise to the nearest minute. The following qualifying symbols are used:

E = Event in progress before observations began.
D = Event continues after observations cease.
I = Event apparently continued during an interruption of the observations. The period of the interruption may be given in the remarks.
S = Measurement may be influenced by interference or atmospherics.

The types of the outstanding occurrences follow the classification described by Dodson, Hedeman and Owren (Ap J. <u>118</u>, 169, 1953), in which the types are identified by numbers which describe the character of the trace, but not the magnitude of the event, as follows:

0 - <u>Rise in base level</u> -- A temporary increase in the continuum with duration of the order of tens of minutes to an hour.

1 - <u>Series of bursts</u> -- Bursts or groups of bursts, occurring intermittently over an interval of time of the order of minutes or hours. Such series of bursts are assigned as distinctive events only when they occur on a smooth record or show as a distinct change in the activity.

2 - Groups of bursts -- A cluster of bursts occurring in an interval of time of the order of minutes.

3 - Minor burst -- A burst of moderate or small amplitude, and duration of the order of one or two minutes.

4 - Minor burst and second part -- A double rise in flux in which the early rise is a minor burst.

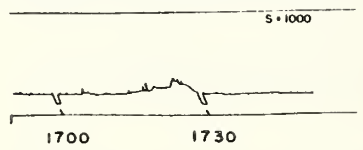
6 - Noise storm -- A temporary increase in radiation characterized by numerous closely spaced bursts, by an increase in the continuum, or by both. Duration is of the order of hours or days.

7 - Noise storm begins -- The onset of a noise storm occurs at some time during the observing period.

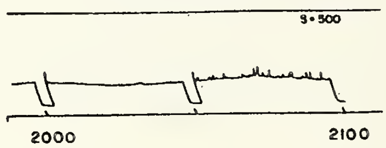
8 - Major burst -- An outburst, or other burst of large amplitude and more than average duration. A major burst is usually complex, with a duration of the order of one to ten minutes.

9A, 9B, or 9 -- Major burst and second part or large event without distinct first and second parts -- If there is a double rise in flux, the first part, a major burst, is listed as 9A and the second part as 9B. The second part may consist of a rise in base level, a group or series of bursts, a noise storm. A major increase in flux with duration greater than ten minutes but without distinct first and second parts, is listed simply as 9.

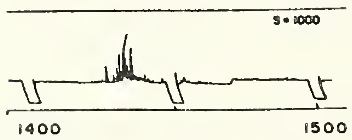
O-RISE IN BASE LEVEL



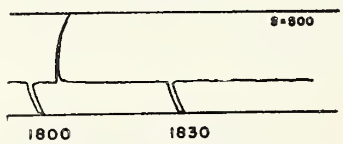
I - SERIES



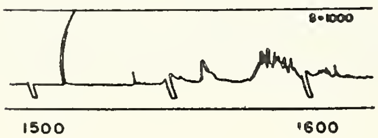
2 - GROUP



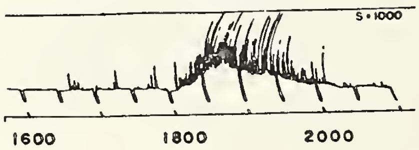
3 - MINOR



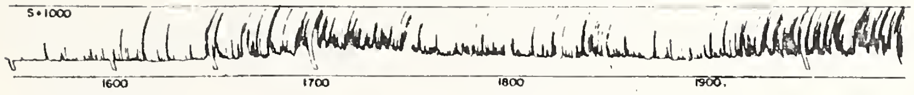
4 - MINOR+



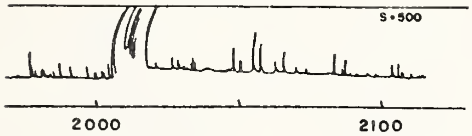
7-ONSET OF NOISE STORM



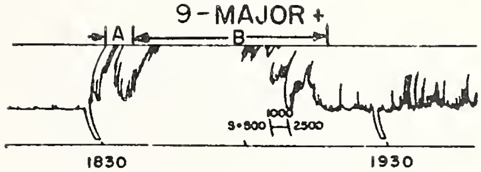
6-NOISE STORM IN PROGRESS



8-MAJOR



9-MAJOR+



Note: In the present table, the type classifications 0 and 1 are not used; they have been included above only for information.

169 Mc Interferometric Observations

The 169 Mc interferometric observations are recorded around local noon at Nançay (Cher), France, (N47°23', E8^{m}47^{s}) the field station of the Meudon Observatory.

The main lobes are parallel to the meridian plane: the half-power width is 3.8 minutes in the East-West direction and much larger than the solar diameter in the North-South direction. The main lobes are about 2° apart (Ann. Astrophys. 20, 155, 1957). The records give the strip intensity distribution from the center of the disk to 30' to the West and East.

These daily distributions are plotted on the same chart giving diagrams of evolution (C.R. 244, 1460, 1957). Points of intensity 0.5 - 0.75 - 1.0 - 1.5 and 2.0 times 10^{-22} watts/m^2/c/s are joined day after day in the form of isophotes. Black dots give the position of the center of the radio spots for each day; a line indicates the width of the recorded lobe pattern when it can be measured with certainty. For each radio spot the smoothed intensity around noon is given in 10^{-22} watts/m^2/c/s.

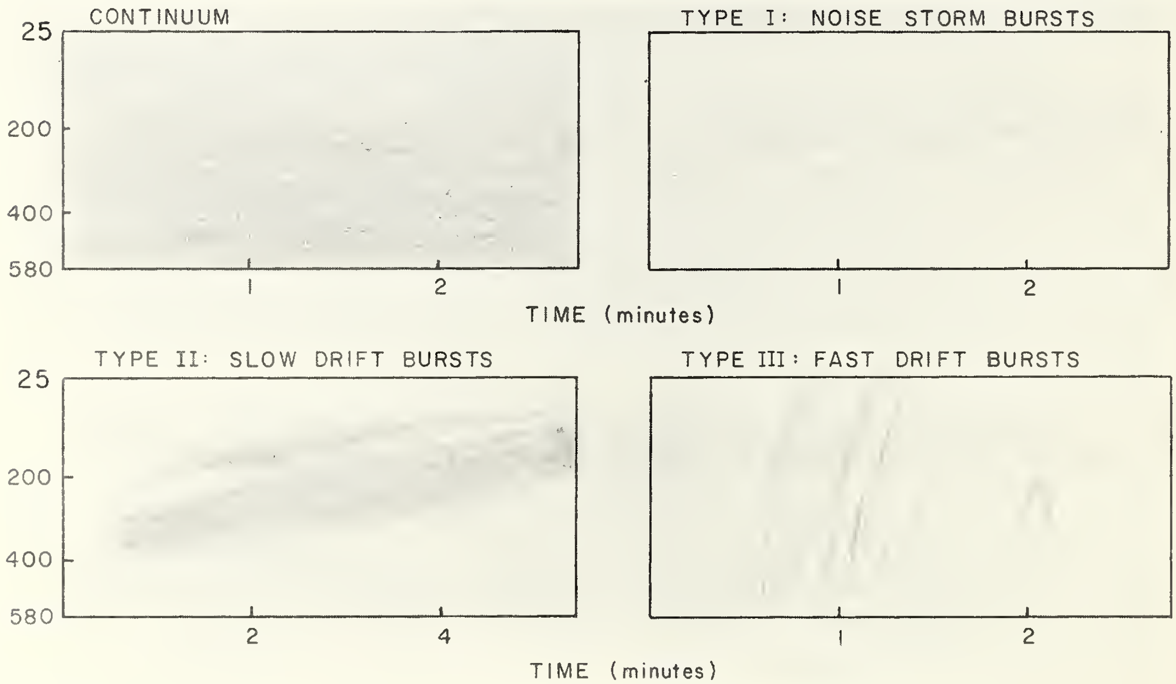
Note that the isophotes cannot be measured when a radio spot of large intensity is on the disk.

Spectrum Observations

Data on solar radio emission in the spectral range 25-580 Mc/s recorded at the Radio Astronomy Station of Harvard College Observatory, Fort Davis, Texas, are presented. The research program is supported by financial assistance from the Air Force Cambridge Research Center, through the offices of Sacramento Peak Observatory.

The receiving equipment consists of five separate sweep frequency receivers covering the bands 25-50, 50-100, 100-180, 170-320, 300-580 Mc/s. The 25-50 and 50-100 Mc/s receivers are each connected to broad band dipoles which are cross polarised and mounted over a reflecting screen. The other three receivers are attached to separate broad band feeds mounted coaxially at the primary focus of an 8.55 meter diameter paraboloid, the 170-320 Mc/s feed being cross polarised with the other two feeds. The effective collecting area of the antenna is 40 sq. meters at 100 Mc/s and 45 sq. meters at 500 Mc/s.

The four types of recognized spectral activity are idealized below:



The large scale examples of continuum, sometimes called Type IV, are listed as "Cont. IV" in the tables. Photographic examples of the bursts have been published by Maxwell, Swarup, and Thompson (Proc. IRE 46, 142, 1958), and Maxwell (Sky and Telescope 17, 388, 1958; 18, 544, and 556, 1959). A few remaining solar radio bursts are tabulated as unclassified.

The symbols used in the tables are:

b = single burst
g = small group (<10) of bursts
G = large group (≥10) of bursts
⟶ = Arrows indicate continuity of solar activity between two Greenwich days.

The minimum detectable level of solar activity is a function of frequency: approximately 5×10^{-22} watts meter $^{-2}$ $(c/s)^{-1}$ at 500 Mc/s. The equipment records signals over an intensity range of approximately 10,000:1. There are three classes of intensity given in the tables. For 100 Mc/s they are:

1 = Faint, 5 to 40×10^{-22} watts meter^{-2} $(c/s)^{-1}$.

2 = Moderate, 30 to 200×10^{-22}.

3 = Strong, $>200 \times 10^{-22}$.

The times are Universal Time (U. T.). The accuracy is to the nearest half minute, except in the case of major outbursts which are specified to the nearest 0.1 minute.

Details of the frequency ranges of activity may be obtained on request to the Radio Astronomy Station, Ft. Davis, Texas.

V GEOMAGNETIC ACTIVITY INDICES

C, Kp, Ap, and Selected Quiet and Disturbed Days -- The data in the table are: (1) preliminary international character figures, C; (2) geomagnetic planetary three-hour range indices, Kp; (3) daily "equivalent amplitude," Ap; (4) magnetically selected quiet and disturbed days.

This table is made available by the Committee on Characterization of Magnetic Disturbances of IAGA, IUGG. The Meteorological Office, De Bilt, Holland collects the data from magnetic observatories distributed throughout the world, and compiles C and selected days. The Chairman of the Committee computes the planetary and equivalent amplitude indices. The same data are also published quarterly in the Journal of Geophysical Research along with data on sudden commencements (sc) and solar flare effects (sfe).

The C-figure is the arithmetic mean of the subjective classification by all observatories of each day's magnetic activity on a scale of 0 (quiet) to 2 (storm).

Kp is the mean standardized K-index from 12 observatories between geomagnetic latitudes 47 and 63 degrees. The scale is 0 (very quiet) to 9 (extremely disturbed), expressed in thirds of a unit, e.g. 5- is 4 2/3, 5o is 5 0/3, and 5+ is 5 1/3. This planetary index is designed to measure solar particle-radiation by its magnetic effects, specifically to meet the needs of research workers in the ionospheric field. A complete description of Kp has appeared in Bulletin 12b, "Geomagnetic Indices C and K, 1948" of the Association of Terrestrial Magnetism and Electricity (IATME), International Union of Geodesy and Geophysics.

Ap is a daily index of magnetic activity on a linear scale rather than on the quasi-logarithmic scale of the K-indices. It is the average of the eight values of an intermediate 3-hourly index "ap," defined as one-half the average gamma range of the most disturbed of the three force components, in the three-hour interval at standard stations; in practice, ap is computed from the Kp for the 3-hour interval. The extreme range of the scale of Ap is 0 to 400. The method is described in IATME Bulletin No. 12h (for 1953) p. viii f. Values of Ap (like Kp and Cp) have been published for the Polar Year 1932/33 and for the years 1937 onwards.

The magnetically quiet and disturbed days are selected in accordance with the general outline in Terr. Mag. (predecessor to J. Geophys. Res.) 48, pp 219-227, December 1943. The method in current use calls for ranking the days of a month by their geomagnetic activity as determined from the following three criteria with equal weight: (1) the sum of the eight Kp's; (2) the sum of the squares of the eight Kp's; and (3) the greatest Kp.

Chart of Kp by Solar Rotations -- The graph of Kp by solar rotations is furnished through the courtesy of Dr. J. Bartels, Geophysikalisches Institute, Göttingen.

VI RADIO PROPAGATION QUALITY INDICES

One can take as the definition of a radio propagation quality index: the measure of the efficiency of a medium-powered radio circuit operated under ideal conditions in all respects, except for the variable effect of the ionosphere on the propagation of the transmittal signal. The indices given here are derived from monitoring and circuit performance reports, and are the nearest practical approximation to the ideal index of propagation quality.

Quality indices are usually expressed on a scale that ranges from one to nine. Indices of four or less are generally taken to represent significant disturbance. (Note that for geomagnetic K-indices, disturbance is represented by higher numbers.) The adjectival equivalents of the integral quality indices are as follows:

1 = useless	4 = poor-to-fair	7 = good
2 = very poor	5 = fair	8 = very good
3 = poor	6 = fair-to-good	9 = excellent

CRPL forecasts are expressed on the same scale. The tables summarizing the outcome of forecasts include categories P-Perfect; S-Satisfactory; U-Unsatisfactory; F-Failure. The following conventions apply:

P - forecast quality equal to observed

S - forecast quality one grade different from observed

U - forecast quality two or more grades different from observed when <u>both</u> forecast and observed were ≥ 5, or both < 5

F - other times when forecast quality two or more grades different from observed

Full discussion of the reliability of forecasts requires consideration of many factors besides the over-simplified summary given.

The quality figures represent a consensus of experience with radio propagation conditions. Since they are based entirely on monitoring or traffic reports, the reasons for low quality are not necessarily known and may not be limited to ionospheric storminess. For instance, low quality may result from improper frequency usage for the path and time of day. Although, wherever it is reported, frequency usage is included in the rating of reports, it must often be an assumption that the reports refer to optimum working frequencies. It is more difficult to eliminate from the indices conditions of low quality for reasons such as multipath or interference. These considerations should be taken into account in interpreting research correlations between the Q-figures and solar, auroral, geomagnetic or similar indices.

<u>North Atlantic Radio Path</u> -- The CRPL quality figures, Qa, are compiled by the North Atlantic Radio Warning Service (NARWS), the CRPL forecasting center at Ft. Belvoir, Virginia, from radio traffic data for North Atlantic transmission paths closely approximating New York-to-London. These are reported to CRPL by the Canadian Defense Research Board, Canadian Broadcasting Corporation, and the following agencies of the U.S. Government:--Coast Guard, Navy, Army Signal Corps, U.S. Information Agency. Supplementing these data are CRPL monitoring, direction-finding observations and field-strength measurements of North Atlantic transmissions made at Belvoir.

The original reports are submitted on various scales and for various time intervals. The observations for each 6-hour interval are averaged on the original scale. These 6-hour indices are then adjusted to the 1 to 9 quality-figure scale by a conversion table prepared by comparing the distribution of these indices for at least four months, usually a year, with a master distribution determined from analysis of the reports originally made on the 1 to 9 quality-figure scale. A report whose distribution is the same as the master is thereby converted linearly to the Q-figure scale. The 6-hourly quality figure is the mean of the reports available for that period.

The 6-hourly quality figures are given in this table to the nearest one-third of a unit, e.g. 5o is 5 and 0/3; 5- is 4 and 2/3; 5+ is 5 and 1/3. Other data included are:

(a) Whole-day radio quality indices, which are weighted averages of the four 6-hourly indices, with half weight given to quality grades 5 and 6. This procedure tends to give whole-day indices suitable for comparison with whole-day advance forecasts which seek to designate the days of significant disturbance or unusually quiet conditions.

(b) Short-term forecasts, issued every six hours by the North Atlantic Radio Warning Service. These are issued one hour before 00^h, 06^h, 12^h, 18^h, UT and are applicable to the period 1 to 7 hours ahead.

(c) Advance forecasts (CRPL-J) are issued once a week and are applicable 1 to 7 days ahead. They are modified as necessary by the Special Disturbance Warning (CRPL-SDW) applicable 1 to 3 days ahead, which may be followed by a supplementary forecast (CRPL-Js) applicable to days remaining until next CRPL-J forecast. The forecast entitled "final" consists of the most recent of the above forms and is scored against the whole-day quality index.

(d) Half-day averages of the geomagnetic K indices measured by the Fredericksburg Magnetic Observatory of the U.S. Coast and Geodetic Survey.

A chart compares the short-term forecasts with Qa-figures. A second chart compares the outcome of the final advance forecasts with a type of "blind" forecast. For the latter, the frequency for each quality grade, as determined from the distribution of quality grades in the four most recent months of the current season, is partitioned among the grades observed in the current month in proportion to the frequencies observed in the current month.

Ranges of useful frequencies on the North Atlantic radio path are shown in a series of diagrams, one for each day. The shaded area indicates the range of frequencies for which transmissions of quality 5 or greater were observed. The blacker the diagram, the quieter the day has been; a narrow strip indicates either high LUHF, low MUF, or both. These diagrams are based on data reported to CRPL by the German Post Office through the Fermeldetechnischen Zentralamtes, Darmstadt, Germany, being observations every one and a half hours of selected transmitters located in the eastern portion of North America. Since January 6, 1958 the transmitters monitored are restricted to those located north of 39° latitude. The magnetic activity index, A_{Fr}, from Fredericksburg, Va., is also given for each day.

Note: Beginning with data for September 1955, Qa has been determined from reports that are available within a few hours or at most within a few days, including for the first time, the CRPL observations. Therefore these are the indices by which the forecasters assess every day the conditions in the recent past. Over a period of several years, they have closely paralleled the former Qa indices which excluded CRPL observations and included three additional reports received after a considerable lag. Qa was first published to the nearest one-third of a unit at the same time.

North Pacific Radio Path -- The CRPL quality figures, Qp, are compiled by the North Pacific Radio Warning Service (NPRWS), the CRPL forecasting center at Anchorage, Alaska, from radio traffic data for moderately long transmission paths in the North Pacific equivalent to Seattle-to-Anchorage or Anchorage-to-Tokyo. These include reports to CRPL by the Army Command and Administrative Network, U. S. Air Force and Federal Aeronautical Administration. In addition, there are CRPL monitoring, direction finder observations and field strength measurements of suitable transmissions.

The original reports are on various scales and for various time intervals. The observations for each 8 hours or 24 hour period are averaged on the original scale. This average is compared with reports for the same period in the preceding two months and expressed as a deviation from the 3-month mean. The deviations are put on the 1 to 9 scale of quality which is assumed to have a standard deviation of 1.25 and a mean for the various periods as follows:

07-18 hours UT	5.33	00-24 hours UT	5.67
19-06	6.00		

The 12-hour and 24-hour indices Qp are determined separately. Each index is a weighted mean where the CRPL observations have unit weight and the others are weighted by the correlation coefficient with the CRPL observations.

The table, analagous to that for Qa, includes the 12-hourly quality figures; whole day quality figures; short-term forecasts issued by NPRWS twice daily at 06^h and 18^h UT, applicable to the stated 12-hour periods; advance forecasts issued weekly by NPRWS (CRPL-Jp report) modified as necessary by Special Disturbance Warnings (CRPL-SDW) and supplementary forecasts (CRPL-Jps); and half-day averages of geomagnetic K indices from Sitka.

The chart compares the outcome of the final advance forecasts, on the same basis as the similar chart for the North Atlantic Radio Path.

Note: Beginning with March 15, 1959 the short-term forecast schedule was changed from three times daily to twice daily. The North Pacific quality figures used for evaluation are now 12-hourly rather than 8-hourly.

VII ALERT PERIODS AND SPECIAL WORLD INTERVALS

This table gives the Advance Geophysical Alerts as initiated by the Western Hemisphere Regional Warning Center at Ft. Belvoir, Va., and also the Worldwide Geophysical Alerts and Special World Intervals as designated by the World Warning Agency, Ft. Belvoir, Va.

Advance Alerts are of four types, defined as follows:

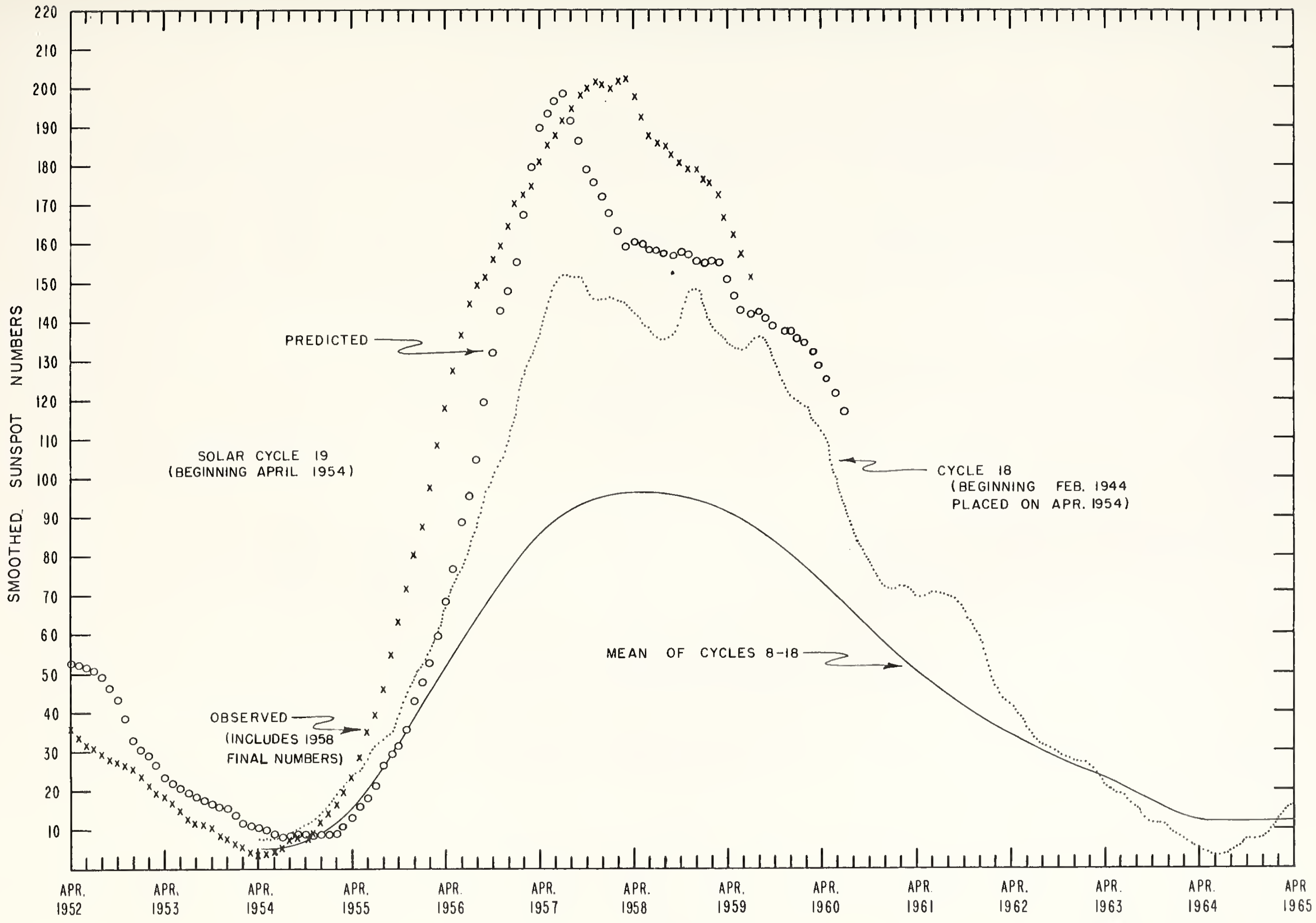
1 - Solar Flare Alert -- this warning is issued whenever a solar flare of median importance 2 plus or greater has been reported. There will be only one alert issued per flare and only one a day at most.
2 - Magnetic Storm Alert -- this warning is issued whenever a significant magnetic storm, K figure 5 or greater at a middle latitude station has begun.
3 - Cosmic Ray Alert -- this warning is issued whenever a very outstanding change in cosmic ray flux has been observed -- increase or decrease.
4 - Aurora Alert -- this warning is issued whenever a magnetic storm in middle latitudes has reached K figure 7 intensity or whenever selected auroral stations report the presence of outstanding aurora.

Worldwide Alerts are of the same types as the Advance Alerts, except that the Solar Flare Alert and Cosmic Ray Decrease Alert are omitted. Alert announcements include the event and time of event upon which the alert is based, and, in the case of the Advance Alerts, the station reporting the event.

The World Alerts and Special World Intervals are issued by the World Warning Agency on decisions based on Advance Alerts, advice received from Regional Warning Centers and overall policy.

Dec. 1959	American Relative Sunspot Numbers R_A'
1	164
2	192
3	194
4	174
5	155
6	152
7	131
8	138
9	97
10	76
11	72
12	74
13	79
14	82
15	120
16	108
17	105
18	131
19	163
20	174
21	154
22	116
23	110
24	121
25	143
26	134
27	150
28	153
29	120
30	113
31	131
Mean:	129.9

Jan. 1960	Zürich Provisional Relative Sunspot Numbers R_Z	Daily Values Solar Flux at 2800 Mc, Ottawa, Canada Flux
1	136	
2	110	175
3	133	182
4	156	193
5	158	213
6	174	215
7	167	224
8	153	219
9	150	201
10	127	194
11	143	200
12	108	184
13	108	178
14	118	176
15	112	183
16	119	183
17	117	179
18	89	176
19	80	164
20	94	157
21	103	162
22	134	172
23	138	188
24	130	210
25	152	230
26	209	242
27	186	248
28	159	252
29	193	237
30	178	230
31	178	224
Mean:	139.1	199.7



PREDICTED AND OBSERVED SUNSPOT NUMBERS

CALCIUM PLAGE AND SUNSPOT REGIONS

JANUARY 1960

CMP Jan. 1960	Lat	McMath Plage Number	Return of Region	Calcium Plage Data: CMP Values Area	Int.	History	Age	Sunspot Data: CMP Values Area	Count	History
01.1	N09	5512	5478	2000	2.5	ℓ – ℓ	2	80	7	b / ℓ
02.1	N22	5513	5478	3000	2.5	ℓ \ ℓ	2	50	2	ℓ \ d
03.2	N08	5519	New	400	1	b Λ d	1			
04.3	S15	5514	5482	3200	2.5	ℓ – d	5	80	4	ℓ – ℓ
04.5	N11	5516	New	1400	2.5	ℓ / ℓ	1	20	1	ℓ V ℓ
05.6	N09	5517	5484	700	2.5	ℓ – ℓ	5	320	6	ℓ – ℓ
06.6	S18	5515	5486	3500	3	ℓ – ℓ	4	370	3	ℓ – ℓ
07.6	N07	5521	5495	900	2	ℓ – ℓ	2	50	2	b Λ d
07.7	N25	5520	New	2700	2.5	ℓ – ℓ	1	20	1	ℓ / ℓ
09.0	S23	5522	New	3200	3	ℓ – ℓ	1	440	2	ℓ – ℓ
09.1	N17	5524	New	600	2.5	ℓ – ℓ	1	(20)	(1)	ℓ ⌝ d
09.3	S01	5523	New	2100	3	ℓ – ℓ	1	560	14	ℓ – ℓ
10.2	S16	5525	New	6300	3	ℓ – ℓ	1	1020	6	ℓ \ ℓ
10.2	S03	5526	5490	600	2.5	ℓ / ℓ	4	70	3	b Λ d
11.6	N20	5527	5491	3500	2.5	ℓ – ℓ	2	730	5	ℓ – ℓ
12.5	S21	5530	New	500	1	ℓ / ℓ	1	50	1	b / ℓ
13.4	N03	5528	*	3000	2	ℓ \ ℓ	6,2			
14.4	N25	5531	New	500	1.5	ℓ \ d	1			
15.1	S16	5529	New	300	1.5	ℓ ⌝ d	1			
15.9	N10	5532	5497	600	2	ℓ \ d	6			
16.3	S06	5533	5499	800	2.5	ℓ / ℓ	3	50	1	ℓ \ d
16.7	N22	5535	New	500	2	ℓ ⌝ d	1			
17.7	N09	5534	5501	2000	2.5	ℓ – ℓ	4			
17.8	S18	5536	5500	800	1	ℓ / ℓ	4	60	1	ℓ \ d
19.3	N07	5538	New	2200	3.5	ℓ – ℓ	1	100	5	ℓ – ℓ
19.5	N20	5537	5502	1700	2	ℓ – ℓ	4			
21.1	N09	5540	**	3700	3	ℓ – ℓ	3	150	4	ℓ \ d
21.5	N26	5539	**	2600	3	ℓ – ℓ	3	540	4	ℓ – ℓ
22.2	N13	5541	**	2900	3	ℓ – ℓ	3	(20)	(1)	ℓ ⌝ d
23.0	S13	5543	New	700	2	ℓ – ℓ	1	100	3	b Λ d
23.3	N26	5542	**	3200	3	ℓ – ℓ	3			
23.4	N11	5545	**	2900	3	ℓ – ℓ	3	390	1	ℓ – ℓ
25.0	N12	5546	5507	(5600)	(2.5)	ℓ – ℓ	10			
26.5	S13	5547	5510	(2000)	(2)	ℓ – ℓ	2	190	1	ℓ – ℓ
26.6	N24	5548	5509	4900	3	ℓ – ℓ	4	610	5	ℓ – ℓ
27.2	N09	5549	***	2000	3	ℓ – ℓ	3	400	10	ℓ – ℓ
29.5	N12	5550	***	11000	3	ℓ – ℓ	3	580	26	ℓ – ℓ
31.8	S18	5551	5514	5000	3	ℓ – ℓ	6	510	12	ℓ – ℓ

* 5493 and 5494.
** 5504, 5505, 5506.
*** 5511, 5512, 5513.

CORONAL LINE EMISSION INDICES

JANUARY 1960

CMP Jan 1960	North East Quadrant (observed 7 days earlier)				South East Quadrant (observed 7 days earlier)				South West Quadrant (observed 7 days later)				North West Quadrant (observed 7 days later)			
	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1	G_6	G_1	R_6	R_1
1	x	x	x	x	x	x	x	x	75	124	19	48	161	199	30	54
2	x	x	x	x	x	x	x	x	56	85	7	8	92	109	13	16
3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	93	120	20	36	91	115	24	57	x	x	x	x	x	x	x	x
5	141	167	15	24	148	370	27	51	x	x	x	x	x	x	x	x
6	162	194	29	36	146	190	34	75	x	x	x	x	x	x	x	x
7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
8	x	x	x	x	x	x	x	x	127	182	41	65	131	167	32	41
9	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10	88	102	x	x	99*	126	x	x	x	x	x	x	x	x	x	x
11	117	132	24	33	x	x	19	24	x	x	x	x	x	x	x	x
12	x	x	x	x	x	x	x	x	87	135	22	36	113	137	41	69
13	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
14	100	114	x	x	55	78	x	x	59	99	23	39	84	107	25	39
15	110	128	25	40	74	104	15	20	76	98	12	20	82	99	14	24
16	78	107	17	32	57	78	8	10	x	x	x	x	x	x	x	x
17	x	x	x	x	x	x	x	x	52	114	x	x	107	174	x	x
18	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
19	x	x	x	x	x	x	x	x	30	47	13	16	137	208	47	63
20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
21	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
22	124*	156	52	69	47	54	15	16	x	x	x	x	x	x	x	x
23	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
24	x	x	x	x	x	x	x	x	x	x	16a	21a	x	x	19a	24a
25	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
26	123	138	21	36	93	135	13	24	x	x	x	x	x	x	x	x
27	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
28	132*	152	40	83	61	104	23	39	x	x	x	x	x	x	x	x
29	143	178	30	54	51	117	11	20	x	x	x	x	x	x	x	x
30	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
31	219	267	x	x	157	261	x	x	x	x	x	x	x	x	x	x

x = no observations. a = index computed from low weight data. * = yellow line observed.

SOLAR FLARES
JANUARY 1960

OBSERVATORY	DATE JAN 1960	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
HAWAII	01	0128	0200 D	0158	N12	W54	5507	32 D	1	3	0158	1.40				
MCMATH	01	1607	1650		N24	E80	5520	43	1	1	1618					
WENDEL	02	0950 E	1025 D		N17	W20	5511	35 D	1				3.00			
WENDEL	02	1029	1040 D		N13	E64	5520	11 D	1				3.00			
WENDEL	02	1320	1333 D		S21	E55	5515	13 D	1				3.00			
HAWAII	03	1944 E	2010		N17	W28	5513	26 D	1+	3	1947	2.10				
HAWAII	03	1948	1952	1948	S23	E85	5525	4	1	3	1948	1.10				
CAPRI S	04	0327	0906		S19	E77	5525	39	2+	1	0852	1.90	6.70			
ARCETRI	04	0847	0854		S14	E77	5525	7	1+	3	0848	1.65	4.95			
HAWAII	04	1956 E	2014		N08	W38	5512	18 D	1	2	2004	1.10				
LOCKHEED	04	2025	2058	2029	N08	W37	5512	33	1	1	2029	1.90			30	
HAWAII	04	2026	2048	2030	N09	W37	5512	22	1	3	2030	1.10				
LOCKHEED	04	2142	2207	2149	N15	W57	5511	25	1	1	2149	2.20			10	
ARCETRI	05	0920 E			N10	E04	5517		1	3	0920	2.50	2.50			
ARCETRI	05	0955	0959 D		S11	E65	5525	4 D	1	3						
WENDEL	05	0955	1007		S12	E58	5525	12	1				3.00			
ARCETRI	07	0809 E	0819 D		S12	E40	5525	10 D	1	3						
ARCETRI	07	0819 E			N08	W71	5512		1	3						
CAPRI S	07	1504 E	1542 D		N07	W78	5512	38 D	3	3	1514	3.70	13.00			S-SWF
LOCKHEED	08	1750	1950	1810	S23	W33	5515	120	1	2	1825	2.50			20	
LOCKHEED	08	1750	1950	1825	S23	W33	5515	120	1	2	1825	2.50			20	
LOCKHEED	08	1800	2050	1840	N28	W12	5520	170	2	2	1840	6.40			30	
SAC PEAK	08	1806	2050 U	1842	N26	W14	5520	164 U	2	3		6.85			19	
HAWAII	08	1820 E	2048		N28	W14	5520	148 D	2	2	1850	3.10				
SAC PEAK	09	2106	2130	2112	N19	E21	5527	24	1	2		2.76			13	
ARCETRI	10	0811	0815		S17	W50	5515	4	1	3						
ARCETRI	10	0907 E	0925 D		N08	W90	5516	18 D	1	3						
WENDEL	10	1139 E	1210 D		N08	W85	5516	31 D	1+				5.00			
LOCKHEED	11	2040 U	2355 D	2128 E	N23	E03	5527	195 D	3	1	2128	22.00			30	Slow S-SWF
HAWAII	11	2058 E	2326	2124	N22	E02	5527	148 D	3	3	2124	10.30				
HAWAII	11	2244	2422	2250	N18	W08	5527	98	1+	3	2250	1.90				
HAWAII	11	2258	2312	2302	S12	W90	5515	14	1	3	2302	.50				
SAC PEAK	12	1646	1710	1650	S10	W37	5525	24	1	3		2.60			17	G-SWF
CAPRI S	13	1216 E	1232 D		S18	W44	5525	16 D	1	1	1217	1.70	3.40			
LOCKHEED	13	2247	2350	2305	S03	W08	5530	63	1	1	2305	2.10			10	
WENDEL	15	1334	1400 D		S20	W66	5525	26 D	2				12.00			Slow S-SWF
CAPRI S	15	1336	1455 D		S20	W71	5525	79 D	2	2	1401	4.80	11.50			
ONDREJOV	15	1400 E	1412 D		S20	W69	5525	12 D	2	2	1404			2.50		
LOCKHEED	15	1645	1730	1658	S06	E08	5533	45	1	1	1658	2.00			20	
LOCKHEED	15	1730 D	1738 U	1732	N09	E90	5540	8 D	1	1	1732	2.00			30	Slow S-SWF
WENDEL	16	1005	1021 D		N26	E73	5539	16 D	1				3.00			

SOLAR FLARES

JANUARY 1960

OBSERVATORY	DATE JAN 1960	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
HAWAII	16	2108	2112 D	2112	N26	E62	5539	4 D	1	2	2112	1.40				
LOCKHEED	16	2239	2335	2252	N11	E76	5540	56	2	2	2252	5.00			40	Slow S-SWF
HAWAII	16	2240	2258 D	2248	N13	E76	5540	18 D	1	2	2248	1.50				
HAWAII	17	0032	0046 D	0036	N11	E67	5545	14 D	1	2	0036	1.10				
LOCKHEED	17	1708 E	1900 U	1720	N17	E62	5545	112 D	1+	1	1720	4.20			30	Slow S-SWF
LOCKHEED	17	1708 E	1900 U	1750	N17	E62	5545	112 D	1+	1	1720	4.20			30	
HAWAII	17	1800 E	1856		N23	E72	5542	56 D	1+	2	1810	2.20				
ARCETRI	18	0934 E	0943 D		N08	E41	5541	9 D	1	3						
HAWAII	18	2250	2358	2308	N17	E58	5545	68	1	3	2308	1.00				
HAWAII	18	2314	2442		N16	E49	5541	88	1	3	2328	1.40				
SAC PEAK	19	1928	2028	1944	N14	E46	5545	60	1	2		3.97			17	G-SWF
LOCKHEED	19	1947 E	2115 U	1950 U	N18	E45	5545	88 D	1	1	1950	5.00			30	
WENDEL	20	1038 E	1146 D		N07	W57	5528	68 D	1				3.00			
HAWAII.	20	2300	2316	2302	N12	E25	5541	16	1	3	2302	1.30				
HAWAII	23	0000	0014	0002	N27	W16	5539	14	1+	3	0002	1.90				
ONDREJOV	23	1040 E	1044 D		N09	W59	5538	4 D	1	3	1041			2.90		
ONDREJOV	23	1056 E	1104		N09	W59	5538	8 D	1	3	1058			2.70		
ONDREJOV	23	1117	1130	1122	N09	W60	5538	13	1	3	1122			4.80		
HAWAII	23	2038	2046	2038	N12	E49	5549	8	1	2	2038	1.20				
ONDREJOV	24	0855	0904	0858	N06	E57	5550	9	1	3	0858			3.20		
ONDREJOV	24	0928 E	0941		N08	W69	5538	13 D	1	3	0938			3.20		
ONDREJOV	24	1241	1308 D		N06	E55	5550	27 D	1	3	1245			2.30		
WENDEL	24	1242 E	1300 D		N08	E56	5550	18 D	1+				6.00			
WENDEL	24	1306	1358 D		N09	E38	5549	52 D	2				14.00			
ONDREJOV	24	1309 E	1335 D		N08	E35	5549	26 D	2	3	1313			3.20		
CAPRI S	24	1312 E	1402 D		N08	E35	5549	50 D	1+	2	1321	4.00	4.80			
ONDREJOV	25	1241	1303	1243	N06	E55	5550	22	1	3	1243			2.30		
HAWAII	25	2004	2032	2008	N12	E50	5550	28	1	2	2008	1.40				
ARCETRI	26	1022 E	1028 D		N05	E31	5550	6 D	1	2						
SAC PEAK	27	1518	1544	1528	N01	E12	5549	26	1	2		2.60			16	
CAPRI S	27	1520 E	1544 D		N05	E13	5549	24 D	1	2	1530	3.00	3.10			
CAPRI S	28	0828 E	0954 D		N07	E12	5550	86 D	1	1	0832	5.00	5.00			
SAC PEAK	28	2036	2118	2044	N00	W05	5550	42	1+	2		4.78			16	
CAPRI S	29	1038 E	1045 D		S15	E27	5551	7 D	1	1	1040	2.00	2.20			
LOCKHEED	29	1738	1810	1746	N06	W17	5550	32	1	2	1746	2.40			20	
SAC PEAK	29	1820	1902	1846	S19	E58	5554	42	1			2.43			16	
LOCKHEED	30	0005	0033	0015	N03	W22	5550	28	1	2	0015	2.00			30	
HAWAII	30	0110 E	0118		N10	W14	5550	8 D	1	2	0110	1.40				
WENDEL	30	0855 E	0922 D		S15	E21	5551	27 D	1				3.00			
ARCETRI	30	0903 E	0926 D		S17	E17	5551	23 D	1	2						
WENDEL	30	0927 E	0932 D		S18	E49	5554	5 D	1				3.00			

SOLAR FLARES

JANUARY 1960

OBSERVATORY	DATE JAN 1960	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
WENDEL	30	1035	1057		N09	E36	5552	22	1				3.00			
WENDEL	30	1045	1101 D		S15	E20	5551	16 D	1				4.00			
WENDEL	30	1138 E	1150 D		N09	W21	5550	12 D	1				3.00			
WENDEL	30	1140 E	1152 D		N16	E19	5552	12 D	1				4.00			
{ WENDEL	30	1159 E	1229 D		S16	E20	5551	30 D	1				4.00			
{ WENDEL	30	1159 E	1442 D		S17	E19	5551	163 D	1&				8.00			
{ CAPRI S	30	1355 E	1524 D		S17	E21	5551	89 D	1	3	1420	2.00	2.20			
{ CAPRI S	30	1306 E	1320 D		N03	W27	5550	14 D	1	3	1310	3.00	3.30			
{ WENDEL	30	1306	1321		N03	W26	5550	15	1&				5.00			
WENDEL	30	1334	1350 D		N21	E39	5555	16 D	1				4.00			
CAPRI S	30	1432 E	1502 D		N12	E35	5552	30 D	1	3	1436	3.00	3.70			
CAPRI S	31	1028	1042 D		N18	W17	5550	14 D	1	1	1031	2.00	2.10			
CAPRI S	31	1429	1509 D		S16	E04	5551	40 D	1	3	1451	4.80	5.00			
CAPRI S	31	1539	1605 D		S16	E04	5551	26 D	1	1	1600	3.00	3.10			
LOCKHEED	31	1913	2000	1924	S18	E02	5551	47	1	1	1924	2.50			20	
LOCKHEED	31	2035	2103	2047	S18	W00	5551	28	1	1	2047	3.20			20	

COMMERCE - STANDARDS - BOULDER

CAPRI G ANACAPRI - GERMAN
CAPRI S ANACAPRI - SWEDISH
GOOD HOPE ROYAL OBSERVATORY, CAPE OF GOOD HOPE
KIEV* KIEV UNIVERSITY
KODAIKNAL KODAIKANAL
KRASNYA KRASNAYA PAKHRA
LOCKHEED LOS ANGELES

MOSCOW-G MOSCOW - GAISH
R O EDIN ROYAL OBSERVATORY, EDINBURGH
R O HERST GREENWICH ROYAL OBSERVATORY, HERSTMONCEUX
SAC PEAK SACRAMENTO PEAK
SCHAUINS SCHAUINSLAND
USNRL UNITED STATES NAVAL RESEARCH LABORATORY

SAC PEAK: ALL VALUES IN MAX. INT. COLUMN ARE ARBITRARY UNITS (0-40), NOT PERCENT OF CONTINUOUS SPECTRUM.

E - LESS THAN & - PLUS
D - GREATER THAN - - MINUS
U - APPROXIMATE □ - NOT REPORTED

LOCKHEED OBSERVATIONS: ALL VALUES IN THE MAXIMUM INTENSITY COLUMN ARE ARBITRARY UNITS ON A SCALE OF 10 TO 40 - NOT PERCENT OF THE CONTINUOUS SPECTRUM.

INTERVALS OF NO FLARE PATROL OBSERVATIONS
JANUARY 1960

Stations Include:

COMMERCE - STANDARDS - BOULDER

Anacapri (Swedish)
Arcetri
Dunsink
Hawaii
Lockheed
McMath
Meudon
Ondrejov
Sacramento Peak

SUBFLARES

Noted as follows: Date-Universal Time-Coordinates

DECEMBER 1959

	SAC PEAK	01	1504		N15 W75
	LOCKHEED	01	1649		N20 E16
	LOCKHEED	01	1806		N24 W85
	SAC PEAK	01	1808		N25 W90
	SAC PEAK	01	1808		N11 E52
	LOCKHEED	01	1808		N10 E54
	LOCKHEED	01	1808		N10 E54
	LOCKHEED	01	2008		N11 E51
	LOCKHEED	01	2015		N22 E16
	SAC PEAK	01	2018		N24 E18
	LOCKHEED	01	2036		N10 E52
	HAWAII	01	2038	E	N08 W07
	LOCKHEED	01	2041		N12 E02
	SAC PEAK	01	2046		N10 W03
	SAC PEAK	01	2126		N08 W07
	SAC PEAK	01	2150		N08 W08
	LOCKHEED	01	2156		N09 W11
	HAWAII	01	2214		N13 W12
	LOCKHEED	01	2228		N24 W85
	LOCKHEED	01	2252		N09 W09
	HAWAII	01	2306	E	N14 W01
*	LOCKHEED	01	2333		N09 W12
	HAWAII	02	0008	E	S03 E53
	WENDEL	02	1341	E	N11 E38
	SAC PEAK	02	1530		N11 E36
	SAC PEAK	02	1554		S10 W18
	LOCKHEED	02	1554		N07 W14
	LOCKHEED	02	1619		N10 E39
	LOCKHEED	02	1619		N10 E39
	SAC PEAK	02	1622	D	N10 E38
	LOCKHEED	02	1626		N09 W17
	SAC PEAK	02	1628		N09 W18
	LOCKHEED	02	1639		N11 E41
	SAC PEAK	02	1646		N11 E41
	LOCKHEED	02	1648		S15 E74
	LOCKHEED	02	1658		N08 W19
	LOCKHEED	02	1711		S15 E74
	SAC PEAK	02	1712		S15 E73
	LOCKHEED	02	1748		N10 W06
	SAC PEAK	02	1754		N10 E34
	LOCKHEED	02	1754		N11 E33
	HAWAII	02	1756	E	N01 E33
*	LOCKHEED	02	1758		N07 W20
*	SAC PEAK	02	1800		N08 W19
	SAC PEAK	02	1814		N12 E41
	LOCKHEED	02	1815	E	N11 E41
*	LOCKHEED	02	1815	E	N09 W12
	HAWAII	02	1826	E	N04 E39
*	SAC PEAK	02	1844		N11 W14
*	LOCKHEED	02	1850	E	N10 W13
	SAC PEAK	02	2108		N09 W21
	LOCKHEED	03	0011		N10 W16
	WENDEL	03	0950	E	N19 E73
	ARCETRI	03	0957	E	N08 W29
	WENDEL	03	1012	E	N12 E26
	CAPRI S	03	1257	E	N08 W24
*	CAPRI S	03	1412		N08 W25
	MCMATH	03	1516	E	N10 W20
	MCMATH	03	1535	E	N31 E46
	LOCKHEED	03	1545	E	N10 W26
	LOCKHEED	03	1607		N09 W33
	MCMATH	03	1615	E	S14 E64
	MCMATH	03	1630	E	N10 E26
	LOCKHEED	03	1632		N09 E27
	LOCKHEED	03	1632		N09 E27
	LOCKHEED	03	1634		N13 W36
	LOCKHEED	03	1746		N13 W36
	LOCKHEED	03	1749		N10 E27
	HAWAII	03	1902		N07 E23
	LOCKHEED	03	1903		N10 E24
	LOCKHEED	03	1910		S14 E62
	LOCKHEED	03	1944		N09 E24
	LOCKHEED	03	2006		N09 W39
	LOCKHEED	03	2011		N08 W35
	LOCKHEED	03	2018		N09 E22
	LOCKHEED	03	2042		N08 W39
	LOCKHEED	03	2103		N12 E25
	LOCKHEED	03	2142		N08 W35
	LOCKHEED	03	2201		S16 E62
	LOCKHEED	03	2228		N10 E22
	LOCKHEED	03	2250	U	N08 W37
	HAWAII	04	0146		N02 E20
	SAC PEAK	04	1516		N12 W43
	LOCKHEED	04	1611		N08 W48
	LOCKHEED	04	1621		N10 E16
	SAC PEAK	04	1624		N08 E13
	LOCKHEED	04	1624		N07 E13
	LOCKHEED	04	1641		N08 W48
	LOCKHEED	04	1701		N07 E19
	LOCKHEED	04	1741		N06 W49
	LOCKHEED	04	1822		N09 E14
	LOCKHEED	04	1840		S16 E51
	LOCKHEED	04	1843		N08 E11
	SAC PEAK	04	1846		N08 E11
	SAC PEAK	04	1902		N10 E03
	LOCKHEED	04	1905		N11 E03
	LOCKHEED	04	1915		N13 E10
	LOCKHEED	04	1937		N10 E02
*	LOCKHEED	04	1953		N08 W49
	LOCKHEED	04	2008		N11 E02
	LOCKHEED	04	2018		N11 E10
*	LOCKHEED	04	2023		N08 W46
	SAC PEAK	04	2028		N11 E02
	LOCKHEED	04	2044		N11 E02
	LOCKHEED	04	2114		N10 E02
	LOCKHEED	04	2127		N08 E09
	LOCKHEED	04	2136		N11 E01
	LOCKHEED	04	2152		N09 E08
	LOCKHEED	04	2233		N11 E00
	LOCKHEED	04	2235		N08 E07
	LOCKHEED	04	2318		N11 E00
	LOCKHEED	04	2327		N09 E05
	LOCARNO	05	1300	E	N10 W10
	LOCARNO	05	1335	E	N09 W01
	LOCARNO	05	1435		N14 E01
	SAC PEAK	05	1536		N10 W02
	SAC PEAK	05	1554		N09 W11
	SAC PEAK	05	1614		N09 E02
	SAC PEAK	05	1622		N15 W02
	LOCKHEED	05	1626	E	N13 W01
	LOCKHEED	05	1650		N13 W05
	LOCKHEED	05	1701		N11 W10
	LOCKHEED	05	1702		N07 E50
	LOCKHEED	05	1715		N07 W09
	LOCKHEED	05	1715		N05 W62
	LOCKHEED	05	1728		N11 W09
	LOCKHEED	05	1749		N13 W06
	LOCKHEED	05	1754		N12 W01
	LOCKHEED	05	1804		N12 W10
	HAWAII	05	1810	E	N13 W09
	SAC PEAK	05	1816		N11 W10
	LOCKHEED	05	1849		N12 W02
	LOCKHEED	05	1904		N12 E00
	LOCKHEED	05	1919		N13 W03
	SAC PEAK	05	1920	-	N13 W02
	HAWAII	05	1922	E	N14 W09
	SAC PEAK	05	1922		N11 W11
	LOCKHEED	05	1923		N11 W11
*	HAWAII	05	1946	E	N11 W04
	LOCKHEED	05	2002		N07 E50
	HAWAII	05	2008		N13 W10
	LOCKHEED	05	2014		N10 W06
	HAWAII	05	2026		N10 E01
	LOCKHEED	05	2028		N09 E01
	SAC PEAK	05	2038		N12 W12
	LOCKHEED	05	2038		N10 W12
	HAWAII	05	2040		N12 W12
	LOCKHEED	05	2058		N09 E00
	LOCKHEED	05	2058		N09 E00
	LOCKHEED	05	2118		N06 W12
	SAC PEAK	05	2122		N07 W11
	LOCKHEED	05	2137		N11 W05
	SAC PEAK	05	2138		N11 W04
	LOCKHEED	05	2154		N10 W05
	LOCKHEED	05	2154		N10 W05
	HAWAII	05	2200	E	N11 W12
	LOCKHEED	05	2220		N10 W15
	LOCKHEED	05	2223		N11 W06
	LOCKHEED	05	2318		N10 W15
	HAWAII	05	2320	E	N13 W14
*	HAWAII	05	2342		N09 W09
	LOCARNO	06	0955		N11 W12
	LOCARNO	06	1200		N09 W20
	LOCARNO	06	1226		N11 W13
*	WENDEL	06	1233	E	N10 W08
	LOCARNO	06	1238		N08 W18
	LOCARNO	06	1254		N11 W14
	LOCARNO	06	1350		N07 W63
	SAC PEAK	06	1508		N09 W10
	SAC PEAK	06	1526		N07 W23
	SAC PEAK	06	1538		N08 W19
	SAC PEAK	06	1556		N13 W13
	SAC PEAK	06	1616		N07 W21
	LOCKHEED	06	1618		N07 W22
	SAC PEAK	06	1634		N09 W11
	LOCKHEED	06	1635		N09 W11
	LOCKHEED	06	1706		N09 W11
	SAC PEAK	06	1710		N08 W77
*	LOCKHEED	06	1714		N08 W20
	LOCKHEED	06	1730		N09 W12
	SAC PEAK	06	1742		N09 W11
	LOCKHEED	06	1812		N11 W25
	LOCKHEED	06	1812		N11 W25
	SAC PEAK	06	1820		N11 W24
	SAC PEAK	06	1822		N34 E04
	LOCKHEED	06	1822		N36 E03
*	LOCKHEED	06	1903		N11 W18
	SAC PEAK	06	1938		N08 W21
	LOCKHEED	06	1940		N07 W22
	LOCKHEED	06	1945		S19 W90
	SAC PEAK	06	1954		N12 W22
	LOCKHEED	06	1954		N11 W26
	SAC PEAK	06	2100		N10 W22
	LOCKHEED	06	2100		N09 W23
	LOCKHEED	06	2140		N13 W25
	SAC PEAK	06	2140		N12 W24
	LOCKHEED	06	2152		N09 W14
	SAC PEAK	06	2152		N09 W14
	LOCKHEED	06	2223		N12 W61
	LOCKHEED	06	2302		N11 W27
	LOCKHEED	06	2302		N11 W27
	LOCKHEED	07	0007		N07 W26
*	CAPRI S	07	1243	E	N10 W33
	WENDEL	07	1314	E	N09 W19
	SAC PEAK	07	1510		N10 W23
	SAC PEAK	07	1610		N10 W24
	HAWAII	07	1820	E	N16 W37
	HAWAII	07	2036		S19 E13
	HAWAII	07	2212		N25 E50
	WENDEL	08	1154	E	N29 E36
	MCMATH	08	1425	E	N13 W45
	MCMATH	08	1440	E	N17 W01
	MCMATH	08	1441		N28 E36
	MCMATH	08	1444		S17 E07
	MCMATH	08	1530		N07 W49
	MCMATH	08	1621		N13 W43
	MCMATH	08	1656	E	N28 E34
	WENDEL	09	1245	E	N11 W54
*	CAPRI S	09	1317		N10 W48
	SAC PEAK	09	1626	E	N10 W55
	CAPRI S	10	1222	E	N09 W15
	MCMATH	10	1455		N18 E62
	LOCKHEED	10	1548	E	N08 W74
	LOCKHEED	10	1559		N20 W27
	LOCKHEED	10	1610		N09 W74
	LOCKHEED	10	1706		N21 W28
	LOCKHEED	10	1738		N10 W72
	LOCKHEED	10	1938		S06 E47
*	HAWAII	10	2034	E	N13 E68
	HAWAII	10	2102	E	N14 W77
	LOCKHEED	10	2344		N13 W84
	LOCKHEED	10	2345		N07 W90
	WENDEL	11	1112	E	N22 E53
	WENDEL	11	1216	E	N09 W76
	LOCKHEED	11	1625		N21 E48
	LOCKHEED	11	1651		N17 E49
	LOCKHEED	11	1722		N11 W85
	LOCKHEED	11	1754		S02 E77
	LOCKHEED	11	1920		S03 E71
	LOCKHEED	11	2032		N16 E40
	SAC PEAK	11	2036		N06 W90
	LOCKHEED	11	2039		N05 W85
*	LOCKHEED	11	2118		S02 E69
	LOCKHEED	11	2145		N22 E47
	HAWAII	11	2220	E	N12 W90
	LOCKHEED	11	2238		N11 W38
	HAWAII	11	2256		N13 W38
	ARCETRI	12	0830	E	S20 W12
*	ARCETRI	12	0831	E	N20 E40
	WENDEL	12	0850	E	N15 E40
	WENDEL	12	0950	E	N07 W43
	SAC PEAK	12	1634		N17 E33
	LOCKHEED	12	1713		N24 E35
	LOCKHEED	12	1906		N18 E32
	LOCKHEED	12	1917		N10 E58
	LOCKHEED	12	1922		N23 E35
	LOCKHEED	12	1934		N20 E35
	LOCKHEED	12	2111		N24 E32
	LOCKHEED	12	2112		N07 E53
	LOCKHEED	12	2132		N19 E29
	HAWAII	12	2210		N17 E32
	LOCKHEED	12	2210		N23 E32
	LOCKHEED	12	2210		N23 E32
	LOCKHEED	12	2240		N10 E58
	LOCKHEED	12	2242		S07 E19
	HAWAII	12	2256		N16 E28
	LOCKHEED	12	2301		N11 W52
	LOCKHEED	12	2327		N18 E15
	LOCKHEED	12	2341		N18 E31
	HAWAII	13	0052		N14 E31
	MCMATH	13	1427		N16 W69
	MCMATH	13	1654	E	N17 E20
	SAC PEAK	13	1654		N15 E20
	LOCKHEED	14	2017		S14 E11
	SAC PEAK	14	2018		S13 E10
	LOCKHEED	14	2034		S14 E11
	LOCKHEED	14	2034		S14 E11
	LOCKHEED	14	2220		N12 E28
	LOCKHEED	14	2304		S15 W77
	HAWAII	15	0056	E	S08 E33
	WENDEL	15	0823	E	S03 E23
*	ARCETRI	15	0847	E	N11 E59
	WENDEL	15	1018	E	N23 W00
*	WENDEL	15	1119	E	N16 E02
*	WENDEL	15	1120	E	N18 W04
	WENDEL	15	1129	E	S03 E22
	WENDEL	15	1201	E	N09 E56
	LOCARNO	15	1320		N20 W04
	WENDEL	15	1340	E	S15 E50
	LOCKHEED	15	1634		N09 W90
	LOCKHEED	15	1652		S06 E31
	LOCKHEED	15	1656		N08 E54
	LOCKHEED	15	1713		N09 W90
	LOCKHEED	15	1800		N16 W06
	LOCKHEED	15	1826		N06 W56
	LOCKHEED	15	1835		N16 W07
	LOCKHEED	15	1927		S18 E75
	LOCKHEED	15	1945		N25 W07
	LOCKHEED	15	1955		S08 E29
	LOCKHEED	15	1956		S17 E85
	LOCKHEED	15	2007		S08 E29
	HAWAII	15	2154		N17 W08
	LOCKHEED	15	2154		N16 W10
	LOCKHEED	15	2358		S03 E18
*	ARCETRI	16	0846	E	N05 W66
*	WENDEL	16	0913	E	N05 W66
	WENDEL	16	0953	E	N03 W60
	MCMATH	16	1509		S05 E05
	LOCKHEED	16	1647		S15 W16
	SAC PEAK	16	1722		S08 W32
	LOCKHEED	16	1722		S07 W33
	LOCKHEED	16	1751		S16 E85
	LOCKHEED	16	1819		S08 W33
	LOCKHEED	16	1838		S18 E66
	MCMATH	16	1840	E	S16 E65
	HAWAII	16	1846	E	S21 E65
	LOCKHEED	16	2300	E	S21 E65
*	WENDEL	17	0917	E	N11 E30
	WENDEL	17	1018	E	N11 E30
	LOCARNO	17	1120		S16 E53
	MCMATH	17	1547		N15 W36
	SAC PEAK	17	1548		N16 W36
	MCMATH	17	1615	E	S04 W07
	LOCKHEED	17	1724		S03 W07
	LOCKHEED	17	1739		S06 W47
	LOCKHEED	17	1801		S19 E50
	LOCKHEED	17	1816		S07 W47
	LOCKHEED	17	1824		S04 W07
	SAC PEAK	17	1828		S04 W08
	LOCKHEED	17	1939		N22 E73
*	HAWAII	17	2144		S05 W46
*	SAC PEAK	17	2144		S08 W47
	SAC PEAK	17	2158		N25 W34
	LOCKHEED	17	2209		S17 E52
	CAPRI S	18	1348		N02 W15
	SAC PEAK	18	1538		N23 E61
	SAC PEAK	18	1546		S18 E40
	MCMATH	18	1548		S18 E40
	LOCKHEED	18	1548		S18 E40
	LOCKHEED	18	1550	E	N21 W45
	LOCKHEED	18	1814	E	N26 E63
	LOCKHEED	18	1816		N34 W24
	SAC PEAK	18	1816		N30 W20
	SAC PEAK	18	1936		N10 E13
	HAWAII	18	1940	E	N10 E15
	LOCKHEED	18	2121		S06 W64
	HAWAII	18	2254		N20 E60
	HAWAII	19	0014		S05 W64
	HAWAII	19	0030		N02 W27
	MCMATH	19	1425		N23 E48
	MCMATH	19	1548		N24 E48
	MCMATH	19	1555	E	N10 E32
	MCMATH	19	1740	E	N24 E48
	MCMATH	19	1745	E	N10 E32
	HAWAII	19	1756	E	N23 E48
	MCMATH	19	1805	E	N11 W03
	HAWAII	19	1956		S01 W24
	HAWAII	19	2018		N18 W43
	HAWAII	19	2114		N11 W01
*	SAC PEAK	19	2202	E	N25 E45
	HAWAII	19	2306		N11 W01
	HAWAII	19	2320	E	N08 E31
	HAWAII	20	0010		N25 E43
*	CAPRI S	20	0912		S17 E07
	SAC PEAK	20	2002		N16 W78
	SAC PEAK	20	2022		N20 E38
	SAC PEAK	20	2030		S04 W52
	HAWAII	21	0142	E	N17 W80
*	HAWAII	21	0145	E	N21 E32
	LOCKHEED	21	1944		N12 E85
	SAC PEAK	21	2054		N17 E08
	LOCKHEED	21	2056		N17 E07
	LOCKHEED	21	2059		N25 E26
	LOCKHEED	21	2100		N11 W22
	LOCKHEED	21	2106		S18 W05
	LOCKHEED	21	2126		N24 E23
	SAC PEAK	21	2128		N20 E24
	LOCKHEED	21	2142		N11 E85
	HAWAII	21	2334	E	N12 W01
	LOCARNO	22	1110		N07 W08
	MCMATH	22	1502	E	N10 W07
	MCMATH	22	1611		N10 W10
	SAC PEAK	22	1612		N11 W09
	SAC PEAK	22	1800		N13 W08
	MCMATH	22	1800		N11 W11
	SAC PEAK	22	1808		N12 W47
	SAC PEAK	22	1848		N15 W13
	MCMATH	22	1849		N12 W13
	SAC PEAK	22	2100		N25 E21
	SAC PEAK	22	2126		N10 W10
	HAWAII	22	2132	E	N09 W10
	HAWAII	22	2216		N11 W13
	WENDEL	23	0930	E	N21 E35
	HUANCAYO	23	1530		N07 W52
	HUANCAYO	23	1620		N07 W19
	LOCARNO	25	1111		N17 W28
	CAPRI S	26	0832	E	N24 W35
	LOCKHEED	26	1625	E	N20 W39
	LOCKHEED	26	1654		N26 W48
	LOCKHEED	26	1736		N26 W47
	LOCKHEED	26	1751		N26 W47
	LOCKHEED	26	1808		N26 W47

SUBFLARES

Noted as follows: Date - Universal Time - Coordinates

DECEMBER 1959

	Observatory	Date	Time		Coordinates
*	HAWAII	26	1826	E	N28 W47
	LOCKHEED	26	1914		N28 E44
	LOCKHEED	26	2011		S17 W75
	LOCKHEED	26	2041		N28 E43
	LOCKHEED	26	2104		N22 W48
	LOCKHEED	26	2119		S17 W75
	HAWAII	26	2122	E	S15 W73
	HAWAII	27	0026	E	N16 E10
	LOCARNO	27	1336		N10 E56
	SAC PEAK	27	1530		N10 E55
	LOCKHEED	27	1658		N11 E27
	LOCKHEED	27	1724		N18 W06
	LOCKHEED	27	1739		N27 W57
	LOCKHEED	27	1829		N14 W17
	LOCKHEED	27	1832		S18 W90
	HAWAII	27	1942		N20 E75
	LOCKHEED	27	1946	E	N19 E73
	HAWAII	27	2026		N08 W63
	LOCKHEED	27	2211		N11 W27
	HAWAII	27	2217	E	N10 W28
	HAWAII	27	2230		N19 E67
	LOCKHEED	27	2233	U	N21 E70
	HAWAII	27	2254	E	N30 E29
	ARCETRI	28	1003	E	N08 W26
	CAPRI S	28	1415		N20 E57
	SAC PEAK	28	1752		N17 W18
	SAC PEAK	28	1804		N08 W36
	HAWAII	28	2012		N12 W41
	HAWAII	28	2050		S12 E28
	LOCKHEED	28	2216		N09 W12
	LOCKHEED	28	2220		S08 E25
	LOCKHEED	28	2240	E	N12 E38
	HAWAII	29	0004	E	S09 E25
	LOCKHEED	29	1625		N30 E47
	LOCKHEED	29	1702		N11 W52
	LOCKHEED	29	1705		N26 W90
	LOCKHEED	29	1726		S08 E16
*	SAC PEAK	29	1746		N10 W49
*	HAWAII	29	1748	E	N07 W52
	LOCKHEED	29	1755		N23 W90
	LOCKHEED	29	1905		S07 E14
	LOCKHEED	29	1938		N16 W88
	LOCKHEED	29	1938		N16 W88
	LOCKHEED	29	2020		N10 W53
	HAWAII	29	2022		N20 W54
	LOCKHEED	29	2045		S07 E13
	LOCKHEED	29	2050		N10 W53
	HAWAII	29	2222		N10 W56
	HAWAII	29	2356		S10 E09
	CAPRI S	30	0824	E	S09 E05
	LOCKHEED	30	1546		N12 W57
	LOCKHEED	30	1552		N10 W90
	LOCKHEED	30	1820	E	N13 W50
	LOCKHEED	30	1820	E	N13 W50
	LOCKHEED	30	1830		N11 W68
	LOCKHEED	30	1830		N11 W68
	HAWAII	30	1906		N15 W50
	HAWAII	30	1934		N15 W50
	LOCKHEED	30	2105	U	N11 W68
	LOCKHEED	30	2149	D	N31 W09
	MCMATH	31	1526	E	N10 W60
	LOCKHEED	31	1540	E	S17 W71
	LOCKHEED	31	1550		N27 W20
	LOCKHEED	31	1555		N11 W61
	LOCKHEED	31	1638		N28 W14
	LOCKHEED	31	1713		N11 E01
	SAC PEAK	31	1742		N12 W61
	LOCKHEED	31	1742		N12 W59
	HAWAII	31	1746		N11 W65
	HAWAII	31	1846		N11 W90
	LOCKHEED	31	1915		S12 E80
	LOCKHEED	31	2128		N06 E50
	LOCKHEED	31	2133		N13 E07
	HAWAII	31	2134		S06 W14
	LOCKHEED	31	2351		N12 W67

*Rated as flare of importance $\geq$ 1 by other observatories (see CRPL-F 185 Part B).

COMMERCE - STANDARDS - BOULDER

SOLAR FLARES

OCTOBER 1959

OBSERVATORY	DATE OCT 1959	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
ONDREJOV	01	1121 E	1130		S17	E59	5401	9 D	1	3	1122			2.70		
ZURICH	03	1008 E	1016		N08	W52	5389	8 D	1	1	1008		2.00			
ZURICH	04	1155 E	1210		S10	E28	5401	15 D	1	2	1155		2.00			
GOOD HOPE	04	1200 E	1214 D		S11	E28	5401	14 D	1		1200	1.80	2.10			
VOROSHILOV	04	2301	2320	2303	S16	E09	5397	19	1	2	2303	1.90	2.08		71	
LOCARNO	05	1010 E	1020		S15	E08	5401	10 D	1	2	1010		1.00			
ZURICH	05	1319 E	1323		S09	W51	5392	4 D	1	3	1319		2.00			
ZURICH	05	1513 E	1520		S08	E00	5401	7 D	1	3	1513		2.00			
LOCARNO	05	1555	1606 D		N04	E40	5405	11 D	1	2	1600		1.00			
GOOD HOPE	06	0630 E	0643		N07	W67	5396	13 D	1		0630	1.30	3.30			
GOOD HOPE	06	0711	0732	0716	N06	E28	5405	21	1		0716	3.60	4.10			
TASHKENT	06	0714	0719 D	0716	N06	E30	5405	5 D	1	1	0716	6.06	8.00		85	
ABASTUMANI	06	0714 E	0721	0718	N05	E28	5405	7 D	1	1	0718	1.82	2.10			
ZURICH	06	1241 E	1248		S11	W68	5392	7 D	1	3	1241		2.00			
GOOD HOPE	06	1248	1316	1254	N06	W69	5396	28	1		1254	1.00	2.80			
ZURICH	06	1329 E	1341		N30	E61	5408	12 D	1	3	1329		1.00			
GOOD HOPE	06	1343	1355	1348	S11	W69	5392	12	1		1348	1.10	3.20			
LOCARNO	06	1405	1445	1430	N32	E65	5408	40	1	2						
GOOD HOPE	06	1406	1448	1420	N30	E67	5408	42	2		1420	2.30	6.00			
ONDREJOV	06	1409	1445		N30	E62	5408	36	1&	3	1418			3.70		S-SWF
MEUDON	06	1414	1437		N32	E60	5408	23	1							
STOCKHOLM	06	1415 E	1445 D		N26	E62	5408	30 D	2	3	1430	2.00	5.80			
GOOD HOPE	06	1440	1500	1447	N07	W71	5396	20	1		1447	1.20	3.70			
HUANCAYO	06	2005	2037	2013	N29	E61	5408	32	1	2	2013	2.00	4.20	4.20		S-SWF
VOROSHILOV	06	2322	2344	2334	N30	E62	5408	22	1	2	2334	2.35	4.90		74	
VOROSHILOV	06	2359	0007	0002	N30	E60	5408	8	1	2	0002	2.17	4.35		71	
KODAIKNL	07	0500 E	0510 D		N30	E55	5408	10 D	2	2	0500			2.20		
KODAIKNL	07	0500 E	0510 D		N30	E55	5408	10 D	2		0505			1.70		
KODAIKNL	07	0500 E	0510 D		N30	E55	5408	10 D	2		0510			1.30		S-SWF
TASHKENT	07	0502	0544	0504	N32	E59	5408	42	1&	2	0504	3.85	8.00		130	
SYDNEY	07	0505 E	0534		N30	E55	5408	29 D	2	2	0505	4.00	8.00			
UCCLE	07	1033			N30	E55	5408		1	1						
ONDREJOV	07	1041	1048		N28	E51	5408	7	1	3	1043			2.10		
ONDREJOV	07	1103	1112	1104	N10	W75	5394	9	1	3	1104			2.60		
CAPRI G	07	1103 E	1122 D		N10	W80	5394	19 D	1	3	1108		3.00			
GOOD HOPE	07	1155	1321 D	1201	S18	W89	5392	86 D	1		1201	.70				
CAPRI G	07	1210 E	1327 D		S18	W87	5392	77 D	1	3	1216		4.00			
LOCARNO	07	1300 E	1405		N32	E53	5408	65 D	1&	2	1340		3.00			
CAPRI G	07	1305 E	1532 D	1337	N30	E53	5408	147 D	1	3	1337		5.00			S-SWF
ONDREJOV	07	1328	1355	1329	N30	E54	5408	27	1&	3	1329			3.00		
ONDREJOV	07	1426	1445	1431	N29	E52	5408	19	2	3	1431			4.30		S-SWF
ZURICH	07	1439 E	1457		N31	E51	5408	18 D	1	3	1439		5.00			
LOCARNO	07	1450	1540		N32	E53	5408	50	1&	2	1510		4.00			S-SWF
ONDREJOV	07	1458	1534	1500	N29	E52	5408	36	1&	3	1500			3.40		
ZURICH	07	1529 E	1538		N08	E19	5405	9 D	1	3	1529		1.00			S-SWF
ZURICH	07	1529 E	1545		N31	E50	5408	16 D	1	3	1529		5.00			
KYOTO	08	0415 E	0450 D		S10	W90	5392	35 D	1		0415				100	

SOLAR FLARES

OCTOBER 1959

OBSERVATORY	DATE OCT 1959	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
CAPRI S	08	0748	0807		S14	W28	5401	19	1	3	0759	2.20	2.60			
CAPRI G	08	1051 E	1137	1104	N05	W05	5405	46 D	1	3	1104		5.00			
LOCARNO	08	1057	1114		N04	W04	5405	17	1	2						
LOCARNO	08	1425	1455	1432	N03	W06	5405	30	2-	2	1432		6.00			
CAPRI S	08	1428 E	1508 D		S01	W05	5405	40 D	2	2	1437	5.00	5.00			
MEUDON	08	1430	1450	1437	N05	W05	5405	20	1&				8.00			
ONDREJOV	08	1431 E	1441		N07	W07	5405	10 D	1&	3	1437			3.00		
CAPRI G	08	1432 E	1452 D		N03	W02	5405	20 D	2	1	1442		9.00			
PIRCULI	09	1054	1104	1059	N01	W17	5405	10	1	3	1059	2.30	2.62		45	
CAPRI G	09	1058 E	1107		N02	W18	5405	9 D	1	3	1058		3.00			
LOCARNO	09	1249	1304	1254	N08	W08	5405	15	1	2	1254					
ALMA-ATA	10	0326 E	0546 D	0409	S17	W37	5401	140 D	2	2	0409	3.95	9.50		90	S-SWF
SYDNEY	10	0329	0455		S17	W38	5401	86	2	1	0409	4.00	6.00			
TASHKENT	10	0437 E	0624	0500	S16	W49	5401	107 D	2	3	0506	16.52	27.00	2.20	70	
ALMA-ATA	10	0456	0546 D	0503	S19	W54	5401	50 D	2	2	0503	6.86	20.50		75	S-SWF
SYDNEY	10	0457	0518	0501	S10	W56	5401	21	2	1	0501	3.00	5.00			
SYDNEY	10	0457	0523 D		S19	W54	5401	26 D	3	1	0505	11.00	21.00			
LOCARNO	10	0836	0910		N31	E15	5408	34	1	3						
ONDREJOV	10	1029 E	1034		S08	E70	5418	5 D	1	3	1030			2.80		
ZURICH	10	1029 E	1034		S10	E74	5418	5 D	1	1	1029		1.00			
ZURICH	10	1029 E	1050		S16	W44	5401	21 D	1	1	1029		2.00			
LOCARNO	10	1030 E	1035 D		S17	W44	5401	5 D	1	3						
GOOD HOPE	10	1102	1114	1104	S17	W57	5401	12	1		1104	1.10	2.10			
ONDREJOV	10	1242 E	1247		S17	W46	5401	5 D	1	3	1242			3.40		
CAPRI G	10	1440 E	1455		N21	W20	5406	15 D	1	2	1442		6.00			
SYDNEY	11	0433	0454	0436	S17	W54	5401	21	1	2	0436	1.50	3.00			
CAPRI G	11	0828	0834		S17	W58	5401	6	1	3	0829		3.00			
KIEV	11	1022	1032	1024	N07	E85	5420	10	1&	2	1024	.88	6.30		52	
CAPRI S	11	1123 E	1245 D		S16	W59	5401	22 D	1	1	1208	1.40	2.50			
CAPRI G	11	1147 E	1250 D		S17	W57	5401	63 D	1	2	1150		6.00			
GOOD HOPE	11	1148	1257	1202	S17	W57	5401	69	1&		1202	2.10	4.20			
GOOD HOPE	11	1358	1414	1400	S18	W63	5401	16	1		1400	1.00	2.60			
CAPRI G	11	1400 E	1403 D		S17	W61	5401	3 D	1	2	1403		3.00			
GOOD HOPE	11	1442	1444 D		S04	E88	5418	2 D	1		1443	.50				
SYDNEY	11	2258	2304 D	2259	S16	W66	5401	6 D	2	2	2259	2.00	6.00			
GOOD HOPE	12	0636 E	0653		N05	W50	5405	17 D	1		0636	1.80	2.80			
PIRCULI	12	0810	0815	0813	N13	E01	5411	5	1	2	0813	.83	.90		44	
PIRCULI	12	0843 E	0904 D		N05	W50	5405	21 D	1&	2	0904	1.38	2.34		59	
LOCARNO	12	0900 E	1030		N05	W51	5405	90 D	1	3						
MEUDON	12	0917	0948		N20	E00	5409	31	1				3.00			
PIRCULI	12	0922	0950		N30	W12	5408	28	1&	2	0945	2.75	3.33		48	
MEUDON	12	1234	1258	1240	S20	E38	5416	24	1				4.00			
GOOD HOPE	12	1234	1303	1239	S20	E42	5416	29	1		1239	2.30	3.60			
ZURICH	12	1243 E	1249		S20	E39	5416	6 D	1	1	1243		1.00			
ZURICH	12	1243 E	1250		N03	W55	5405	7 D	1	1	1243		2.00			
ZURICH	12	1335 E	1349		N03	W55	5405	14 D	1	2	1335		1.00			
LOCARNO	13	0635	0645		N04	W63	5405	10	1	2						
CAPRI G	13	0713 E	0755	0740	S16	W85	5401	42 D	2	3						

SOLAR FLARES
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OBSERVATORY	DATE OCT 1959	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
GOOD HOPE	13	0743 E	0805		S15	W88	5401	22 D	1		0743	1.90				
GOOD HOPE	13	0815	0925	0821	S19	W90	5401	70	2		0821	1.20				
CAPRI G	13	0821 E	0835		S16	W85	5401	14 D	2	3						
TASHKENT	13	0827 E	0857 D	0852	S19	W85	5401	30 D	1+	2	0852	1.10	11.00		185	
SIMEIZ	13	0836 E	0838 D		N18	E88	5426	2 D	1	1	0838	.46	3.30	1.40		
ONDREJOV	13	0839 E	0907		S15	W85	5401	28 D	1	3	0858			2.50		
LOCARNO	13	0845 E	0900		S06	E14	5424	15 D	1	2						
LOCARNO	13	0845 E	0910		S19	W80	5401	25 D	1	2						
ZURICH	13	1358 E	1401		N00	W70	5405	3 D	1	2	1358		1.00			
PIRCULI	14	0518 E	0549 D	0533	S09	W39	5423	31 D	1	1	0533	1.29	1.85		45	
PIRCULI	14	0558	0602	0600	S08	E02	5424	4	1	1	0600	.73	.82		45	
CAPRI G	14	1245 E	1252 D		N06	W85	5405	7 D	1	3	1246		4.00			
PIRCULI	15	1139 E	1200 D	1149	N28	W52	5408	21 D	1	3	1149	1.19	2.13		45	
PIRCULI	15	1139 E	1200 D	1149	S10	W57	5423	21 D	1	3	1149	.92	1.88		47	
LOCARNO	15	1230 E	1245 D		N29	W49	5408	15 D	1	1						
CAPRI G	16	0721 E	0726 D		S09	W04	5418	5 D	1	3	0722		3.00			
CAPRI S	16	1023	1101 D		S05	W11	5418	38 D	1+	3	1036	2.60	2.60			
LOCARNO	16	1025	1120		S06	W09	5418	55	1	1	1100		2.00			
AROSA	16	1040	1100 D		S05	W08	5418	20 D	1							
ZURICH	16	1227 E	1232		N29	W63	5408	5 D	1	3	1227		2.00			
SYDNEY	17	0052	0104	0057	S08	W40	5424	12	1	2	0057	1.50	2.00			
PIRCULI	17	0641 E	0735 D	0705	N27	W76	5408	54 D	1+	2	0705	1.47	5.41		56	
ONDREJOV	17	0751 E	0801 D		N31	W74	5408	10 D	1	3	0754			2.60		
LOCARNO	17	0850	0920	0900	S04	E53	5427	30	1	1	0900		2.00			
SIMEIZ	17	0850	0930 D	0855 U	S06	E58	5427	40 D	1	1	0855	.90	1.60		66	
GOOD HOPE	17	0851	0915	0852	S05	E56	5427	24	1		0852	1.20	2.20			
CAPRI G	17	0851 E	0921		S05	E56	5427	30 D	1	3	0853		3.00			
AROSA	17	0852	0900 D		S05	E54	5427	8 D	1							
PIRCULI	17	0853 E	0916	0858	S04	E56	5427	23 D	1+	2	0858	1.10	3.18		64	
ABASTUMANI	17	0855	0918 D	0856	S05	E57	5427	23 D	1	3	0908	2.72	5.06	2.50	70	
CAPRI G	17	1406 E	1408		N04	E01	5420	2 D	1	3	1408		3.00			
VOROSHILOV	17	2216 E	2320		S07	E50	5427	64 D	1+	3	2218	3.34	5.19		73	
VOROSHILOV	17	2337	0001	2343	N07	E46	5430	24	1+	3	2343	3.07	4.28		80	
VOROSHILOV	18	0112	0132	0121	N29	W86	5408	20	1	2	0121	.81	4.77		78	
TASHKENT	18	0603	0617	0607	N02	E59	5427	14	1+	2	0608	1.01	2.00	3.80	110	
ONDREJOV	18	0610 E	0615		N02	E57	5427	5 D	1	3	0611			2.90		
SIMEIZ	18	0815 E	0830 D	0819 U	N01	E58	5427	15 D	1	2	0819	1.82	3.20		61	
CAPRI G	18	1117 E	1129		N02	E54	5427	12 D	1	3	1117		3.00			
VOROSHILOV	18	2254	2258	2256	N01	E49	5427	4	1+	3	2256	1.44	2.13		91	
ONDREJOV	19	0624	0632 D		N02	E32	5427	8 D	1	1	0627			2.20		
SIMEIZ	19	0706	0715	0707	S03	E31	5427	9	1	2	0707	.90	1.00		74	
CAPRI G	19	0708 E	0720		S03	E30	5427	12 D	1	3	0710		4.00			
CAPRI G	19	0807 E	0842 D		N09	W22	5420	35 D	1	3	0808		3.00			
KIEV	19	1023	1027	1025	S05	W50	5418	4	1	2	1025	3.11	4.41		66	
CAPRI G	19	1316 E	1356		S04	E11	5425	40 D	1	3	1322		4.00			S-SWF
CAPRI G	19	1320	1420		S05	E27	5427	60	1	3	1322		4.00			S-SWF
ONDREJOV	19	1322	1341	1329	S05	E14	5425	19	1	3	1329			2.10		

SOLAR FLARES
OCTOBER 1959

OBSERVATORY	DATE OCT 1959	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
ONDREJOV	19	1340	1354		S06	E26	5427	14	1	3	1351			1.90		
ONDREJOV	19	1356	1414 D		N08	E27	5430	18 D	1	3	1400			2.30		
CAPRI G	19	1357 E	1430		N09	E21	5430	33 D	2	3	1405		8.00			
CAPRI S	19	1358 E	1420		N17	E22	5428	22 D	1	3	1407	2.50	2.80			
CAPRI G	19	1507 E	1530 D		N08	E90	5433	23 D	□	2						
KYOTO	19	2335 E	2344 D		S07	W55	5418	9 D	1		2335	1.45		1.16	120	
GOOD HOPE	20	0630 E	0656		N05	E85	5433	26 D	1		0630	1.00				
SIMEIZ	20	0837 E	0910	0853 U	N07	E16	5430	33 D	1	2	0853	.90	1.00		63	
SIMEIZ	20	0843	0849 D	0844	N08	E81	5433	6 D	1	2	0844	.46	2.10		66	
CAPRI G	20	0845 E	0848		N06	E78	5433	3 D	1	3	0846		4.00			
CAPRI G	20	1210 E	1245 D		N06	E75	5433	35 D	1	3	1215		5.00			
CAPRI G	20	1237 E	1245 D		N06	E08	5430	8 D	1	3	1239		3.00			
GOOD HOPE	20	1326	1412	1333	S04	E15	5427	46	1		1333	3.20	3.40			
CAPRI G	20	1330 E	1402 D		S03	E14	5427	32 D	1	3	1333		5.00			
CAPRI G	20	1416 E	1435 D		S05	W01	5425	19 D	1	3	1417		3.00			
SIMEIZ	21	0756	0810	0758	S10	W74	5418	14	1	2	0805	1.08	3.40	1.60	63	
KRASNYA	21	0758	0805	0800	S10	W73	5418	7	1	2	0800	1.82	2.70		70	
ABASTUMANI	21	0802 E	0810 D	0803	S09	W71	5418	8 D	1	3	0803	1.09	3.94		76	
PIRCULI	21	0806 E	0821	0814	N06	E69	5433	15 D	1	3	0814	1.01	1.40		52	
ONDREJOV	21	0834 E	0845		S05	E03	5427	11 D	1	3	0835			2.30		
PIRCULI	21	0836	0905	0848	S04	E03	5427	29	1&	3	0848	2.02	2.20		56	
KRASNYA	21	0952	1006	0956	S02	W75	5418	14	1&	2	0956	1.82	2.70		100	
PIRCULI	21	1000	1006	1003	S06	W70	5418	6	1	3	1003	.64	1.99		46	
CAPRI G	21	1139 E	1145 D		N05	E67	5433	6 D	1	3	1140		5.00			
ONDREJOV	21	1142	1155 D	1144	N06	E68	5433	13 D	1	3	1144			2.90		
KYOTO	22	0658 E	0712 D		S11	E90	5438	14 D	1		0658	2.08		1.36	140	
CAPRI G	22	0709 E	0715		S11	W17	5431	6 D	1	3	0710		4.00			
TASHKENT	22	0758 E	0821 D	0801	S10	E89	5438	23 D	1	2	0801	1.46		3.90		
CAPRI G	22	1020 E	1035 D		S09	E77	5438	15 D	1	3	1021		4.00			
GOOD HOPE	22	1236	1259	1241	N13	W66	5421	23	1		1241	1.20	2.80			
CAPRI G	22	1248 E	1257 D		S11	W17	5431	9 D	1	3	1249		4.00			
CAPRI G	22	1424	1455 D		N04	E48	5433	31 D	1	3	1426		2.00			
SYDNEY	23	0302	0327 D	0313	S11	W27	5431	25 D	1	2	0313	3.00	3.00			
PIRCULI	23	0729	0740	0734	N04	W13	5427	11	1	3	0734	.83	.93		45	
PIRCULI	23	0738	0755	0744	S13	W13	5431	17	1	3	0744	1.10	1.28		56	
PIRCULI	23	0740	0800	0750	N06	E36	5433	20	1	3	0750	.55	.75		58	
CAPRI G	23	1120 E	1132 D		N07	E40	5433	12 D	1	3	1123		5.00			
LOCARNO	23	1502	1520		N05	E30	5433	18	1	3	1515		2.00			
LOCARNO	23	1517	1530 D		S08	W33	5431	13 D	2&	3	1525		9.00			
CAPRI G	23	1517	1532 D		S09	W34	5431	15 D	2	2	1520		7.00			
CAPRI S	24	0747	0814 D		S05	W38	5431	27 D	1	3	0802	1.80	2.30			
CAPRI G	24	0750 E	0756 D		S08	W39	5431	6 D	1	3	0752		3.00			
PIRCULI	24	0750	0801	0755	S12	W41	5431	11	1	2	0755	.81	1.12		45	
GOOD HOPE	24	0754	0815	0758	S03	W39	5427	21	1		0758	1.60	2.10			
PIRCULI	24	0759	0810	0804	S02	W39	5427	11	1	2	0804	1.01	1.43		52	
PIRCULI	24	0822	0837	0828	N04	E21	5433	15	1	2	0828	.46	.53		56	
CAPRI G	24	0938 E	0958		S12	W30	5431	20 D	1	3	0940		3.00			
SYDNEY	25	0128	0234 D	0150	N40	W50	5428	66 D	2	3	0150	6.00	11.00			

SOLAR FLARES
OCTOBER 1959

OBSERVATORY	DATE OCT 1959	OBSERVED UNIVERSAL TIME START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	McMATH PLAGE REGION	DURATION — MINUTES	IMPORTANCE	OBS. COND.	MEASUREMENTS TIME — U T	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	PROVISIONAL IONOSPHERIC EFFECT
PIRCULI	25	0700	0710	0704	N13	E11	5433	10	1	1	0704	1.19	1.31		48	
LOCARNO	25	1025	1055		S09	E44	5438	30	1	3						
CAPRI G	25	1200 E	1212		N04	E08	5433	12 D	1	3	1202		4.00			
LOCARNO	25	1433	1440		S12	E42	5438	7	1	3						
LOCARNO	25	1452	1505	1500	N09	E22	5437	13	1	3	1452		1.00			
CAPRI G	26	0745	0758 D		N05	E02	5433	13 D	1	3	0748		4.00			
ONDREJOV	26	1045 E	1101		N05	E01	5433	16 D	1	3	1046			1.90		
GOOD HOPE	27	0739	0750	0742	S16	W63	5431	11	1		0742	1.20	2.80			
CAPRI G	27	0947 E	0952 D		N05	W13	5433	5 D	1	3	0948		4.00			
GOOD HOPE	27	1034	1052	1039	S15	W77	5431	18	1		1039	.90				
GOOD HOPE	27	1050	1102	1051	N09	W15	5433	12	1		1051	2.40	2.50			
KRASNYA	28	1045	1106	1049	N29	E30	5440	21	1	1	1049	2.27	1.40		100	
SYDNEY	31	0155	0216	0158	S10	W34	5438	21	1	2	0158	2.00	2.00			
KYOTO	31	0158 E	0205 D		S10	W28	5438	7 D	1		0159	1.25			100	
KYOTO	31	0158 E	0207 D		S08	W33	5438	9 D	1		0158	3.74			100	
KRASNYA	31	0914	0919	0914	N11	W31	5437	5	1	2	0914	1.40	.80		115	

COMMERCE - STANDARDS - BOULDER

CAPRI G — ANACAPRI - GERMAN
CAPRI S — ANACAPRI - SWEDISH
GOOD HOPE — ROYAL OBSERVATORY, CAPE OF GOOD HOPE
KIEV* — KIEV UNIVERSITY
KODAIKNAL — KODAIKANAL
KRASNYA — KRASNAYA PAKHRA
LOCKHEED — LOS ANGELES

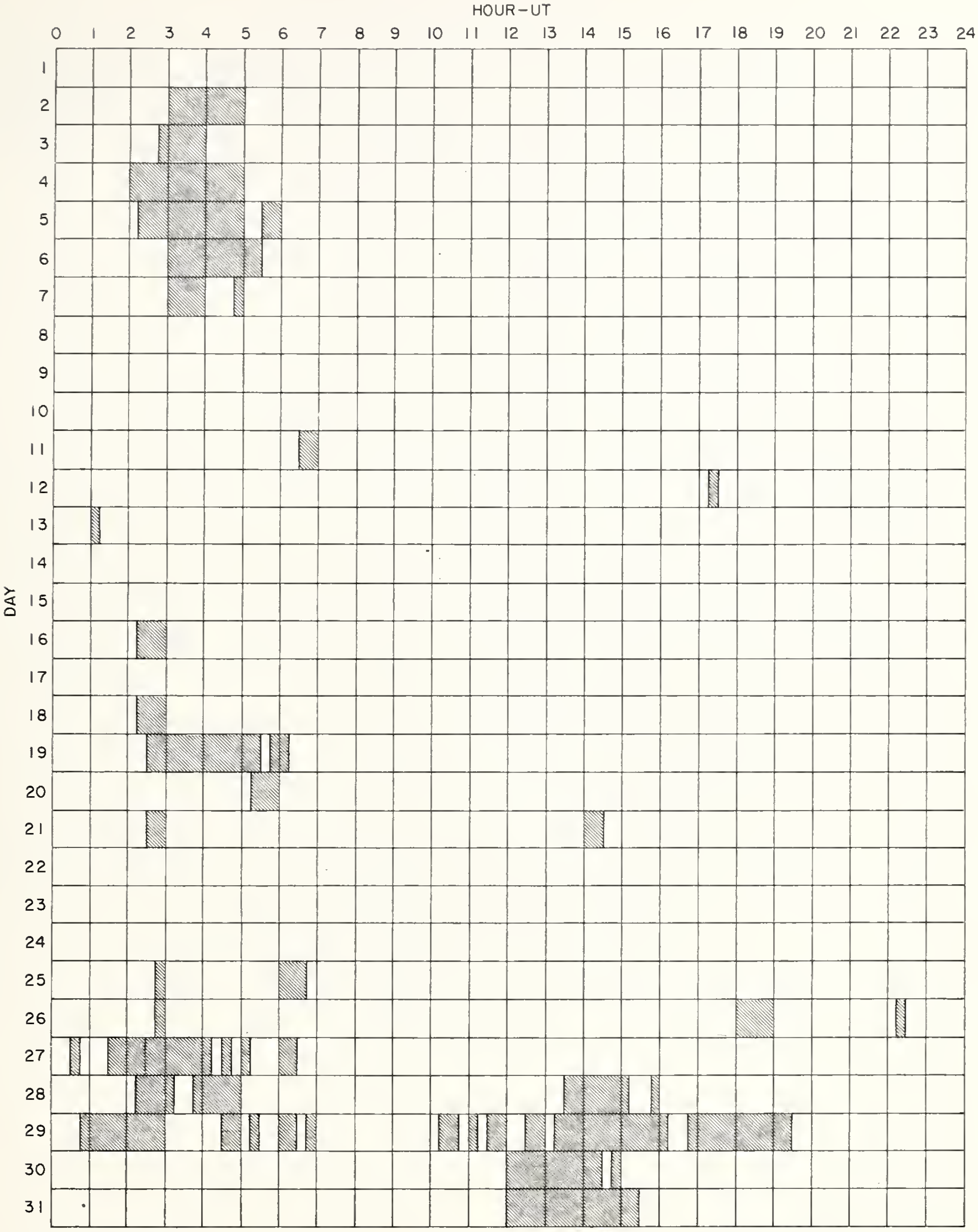
MOSCOW-G — MOSCOW - GAISH
R O EDIN — ROYAL OBSERVATORY, EDINBURGH
R O HERST — GREENWICH ROYAL OBSERVATORY, HERSTMONCEUX
SAC PEAK — SACRAMENTO PEAK
SCHAUINS — SCHAUINSLAND
USNRL — UNITED STATES NAVAL RESEARCH LABORATORY

SAC PEAK: ALL VALUES IN MAX. INT. COLUMN ARE ARBITRARY UNITS (0-40), NOT PERCENT OF CONTINUOUS SPECTRUM.

E - LESS THAN   & - PLUS
D - GREATER THAN   - - MINUS
U - APPROXIMATE   □ - NOT REPORTED

LOCKHEED OBSERVATIONS: ALL VALUES IN THE MAXIMUM INTENSITY COLUMN ARE ARBITRARY UNITS ON A SCALE OF 1 TO 4 - NOT PERCENT OF THE CONTINUOUS SPECTRUM.

INTERVALS OF NO FLARE PATROL OBSERVATIONS
OCTOBER 1959



Stations Include:

COMMERCE - STANDARDS - BOULDER

Abastumani	Hawaii	McMath	Sacramento Peak
Alma Ata	Huancayo	Meudon	Simeiz
Anacapri (Swedish)	Kharkov	Mitaka	Sydney
Arcetri	Kiev GAO	Moscow Gaish	Tashkent
Arosa	Kodaikanal	Nizamiah	Uccle
Athens	Krasnaya Pakhra	Ondrejov	Utrecht
Climax	Kyoto	Pirculi	Voroshilov
Dunsink	Locarno	Royal Greenwich Observatory Herstmonceux	Zurich
Good Hope	Lockheed		

IONOSPHERIC EFFECTS OF SOLAR FLARES

(SHORT-WAVE RADIO FADEOUTS)

DECEMBER 1959

Dec. 1959	Start UT	End UT	Type	Wide Spread Index	Impor-tance	Observation Stations	Known Flare, UT CRPL-F 185
1	1247	1327	S-SWF	1	3	JU	1208E
1	1512	1613	Slow S-SWF	5	2+	BE, FM, HU, LA, MC, NE, PR, WS, CW*	1456E
1	1705	1900	S-SWF	5	3	AN, BE, FM, HU, LA, MC, NE, PR, WS, CW*, **, ***	1638
2	0330	0450	S-SWF	1	3-	OK	*
2	0500	0550	Slow S-SWF	1	2	OK	*
2	1246	1402	S-SWF	5	2+	BE, DA, HU, MC, NE, PR, PU, SW, CW*, **, ***	1219E
3	1017	1047	S-SWF	1	2	NE	1010
3	1414	1500	S-SWF	3	2-	HU, PR	1408E
3	1757	1903	S-SWF	5	2+	AN, BE, FM, HU, LA, MC, NE, PR, WS, CW*	1756
4	0028	0208	S-SWF	5	2+	AD, OK	0032
4	0210	0240	G-SWF	1	1+	OK	0208
4	0800	0840	-	1	-	CW**	*
4	1820	1920	S-SWF	5	2+	BE, FM, HU, LA, MC, PR, WS	1814
5	0620	0633	S-SWF	1	3	KO	*
5	1003	1022	S-SWF	3	2	NE, PU	1004E
5	1220	1232	S-SWF	5	2	BE, NE, PR, PU	1230E
5	1615	1630	S-SWF	5	1	BE, MC, PR, WS	
7	0440	0520	S-SWF	5	2-	CA, KE, OK	0434
7	1042	1107	S-SWF	5	1	PR, PU	*
8	0118	0200	S-SWF	5	1+	AD, CA, OK	0120E
8	0755	0820	S-SWF	5	1+	CA, KO, OK, NE	*
10	0518	0545	S-SWF	5	1+	CA, KO, OK	*
10	2355	0037	Slow S-SWF	5	2	AD, CA, OK	*
11	0407	0430	S-SWF	1	1+	OK	*
12	0800	0810	-	1	-	CW++	0812
17	0400	0422	Slow S-SWF	4	1+	OK, TO	*
18	0637	0657	S-SWF	4	1+	KO, OK	*
19	0345	0405	S-SWF	1	1	OK	*
24	0343	0450	Slow S-SWF	1	2	OK	*

CA = Canberra, Australia
DA = Darmstadt, G.F.R.
JU = Juhlesruh, G.D.R.
KE = Kerguelen
KO = Kodaikanal, India
LA = Los Angeles, Calif.
NE = Nederhorst den Berg, Netherlands

PU = Prague, Czechoslovakia
TO = Hiraiso Radio Wave Observatory, Japan
SW = Enkoping, Sweden
CW* = Cable and Wireless, Barbados
CW** = Cable and Wireless, Somerton, England
CW*** = Cable and Wireless, Brentwood, England
CW++ = Cable and Wireless, Singapore

IONOSPHERIC EFFECTS OF SOLAR FLARES

(Sudden Cosmic Noise Absorption / Sudden Enhancements Of Atmospherics / Solar Noise Bursts At 18 Mc.)

SEPTEMBER 1959

SEPT. 1959	CLASS SCNA	SEA	Burst	WIDESPREAD INDEX	TIME (UNIVERSAL TIME) BEGIN	MAX.	END	PERCENT ABSORPTION SCNA	OBSERVATION STATIONS
1	1			1	0206	0211	0225	15	HA
1			1+	3	1420	1425	1428		MC, RE
1		2		5	1655	1708	1735		BO, DU, HA, NE, PA, SP
1	3			5	1656	1701	1800U	80	BO, HA, MC, RE, SP
1			2	5	1730		2355		BO, HA, MC, SP, (Noise storm, peaks at 1810-1830 (RE) 1950-2007 (RE) 2228-2307)
1		2+		3	1928	1940	2007U		A1, A3, A5
1		2		3	2007	2022	2100		A1, A3, A5
2		1		3	1311		1329		JU, KU
2			1	5	1605		1607		BO, MC, RE, SP
2		1+		5	1606	1615	1640		A3, A5, BO, DU, NE, PA, SP
2	2			5	1607	1610	1635	55	BO, MC, RE, SP
2	1			4	1730	1747	1810	15	BO, MC
2		1		1	1735	1752	1810		BO
2			1	5	1800		0026		BO, HA, MC, (Noise Storm)
3			2	1	1425		1605		MC, (Group of bursts)
3			2	4	1739		1900		BO, MC, SP (Group of bursts)
3			1	1	2115		0030		HA (Noise Storm)
4		1+		3	1605	1632	1710		A2, A5
4			1	5	1700		2345		BO, HA, (Noise Storm)
4			2	1	2320		2326		HA
5			2	5	1554		1600		BO, MC, RE, SP
6			1	1	2045		2048		HA
6			2	1	2158		2205		HA
7			1	1	1615		1623		MC
9		2		1	0703		0741		NE
9	1			5	1557	1605	1625	20	BO, MC, RE, SP
9		2		5	1558	1611	-		BO, MC, NE, SP
9			1	5	1620		1625		BO, MC, RE, SP
9			1	5	1655		1658		BO, MC, SP
9			1	4	1711		1713		BO, MC
9			1	4	1824		1827		BO, MC
9			1	5	1833		1839		BO, MC, SP
9			1	1	2235		2240		MC
11			1	5	2000		2001		BO, HA, MC
12			1	5	2038		2050		BO, HA, MC, SP
13	1			5	1725	1740	1800	10	BO, HA, MC
14		1		1	0745		0821		NE
14			1	5	1833		1835		BO, MC, SP
14	1			5	2156	2200	2210	25	BO, HA, SP
15			1	5	2107		2109		BO, HA
16	1			4	1846	1850	1902	15	BO, MC
16		1		5	1846		-		BO, HA, MC
19			1	5	1939		1948		BO, HA, SP, (Group of bursts)
19			1	5	2027		2030		BO, HA, MC, SP
19			1	1	2203		2208		HA
19			1	1	2211		2218		HA
20			1	5	2147		2148		BO, HA, MC
20	1			1	2255	2300	2312	10	HA
21			1	1	0121		0130		HA
22			1	4	1652		1658		BO, MC
23			1	1	1909	1915	1917		RE
25			1	1	1444		1451		MC
25			2	5	1609		1617		BO, MC, RE
25			1	4	1625		1635		BO, MC
26			1	5	1830		2330		BO, HA, MC, SP, (Noise Storm)
29			1	5	2012		2015		BO, HA
29			1	5	2031		2035		BO, HA
29			1	1	2103		2105		HA

SOLAR RADIO EMISSION
OUTSTANDING OCCURRENCES

JANUARY 1960

Ottawa **2800 Mc**

Jan. 1960	Type	Start UT	Duration Hrs:Mins	Maximum Time UT	Maximum Peak Flux	Remarks
3	2 Simple 2	1725	2	1725.7	12	
8	3 Simple 3	1805	2 30	1900	15	
10	1 Simple 1	1617.5	2	1618	7	
11	2 Simple 2	2056	>35	2108	220	In sunset oscillations
12	6 Complex f	1647.3	9	1649	80	
13	6 Complex f	1446	7	1449.5	18	
	4 Post Increase		15		6	
13	2 Simple 2	1847	4	1847.8	30	
15	6 Complex f	b1340*	>1 40	1357	700	*In interference
	4 Post Increase A		2 30		25	
	2 Simple 2 f	1730.5	8	1732	300	
16	3 Simple 3	b1543	>2 17	1620	10	
17	3 Simple 3 A	b1600	>3 30	indet.	12	
	3 Simple 3	1616	40	1619	8	
19	3 Simple 3 A	1925	>2 10	2007	20	
	6 Complex	1936.5	25	1945	65	
22	2 Simple 2	1649	1.5	1649.3	10	
23	1 Simple 1	1519.5	2	1520.2	6	
24	1 Simple 1	1633	1.5	1633.7	6	
24	1 Simple 1	1715.3	1	1715.5	7	
25	2 Simple 2	1712.5	3.5	1714.2	90	
	4 Post Increase		1 15		6	
30	3 Simple 3 f	2015	12	2021	10	

OUTSTANDING OCCURRENCES

JANUARY 1960

BOULDER

167 MC

Jan. 1960	Type	Start UT	Time of Maximum UT	Duration Minutes	Intensity
3	3	1607.1	1607.2	1.2	1
3	3	1923.4	1923.4	0.1	1
3	3	2133.0	2133.0	0.2	1
3	3	2225.4	2225.6	0.3	2
3	3	2258.3	2258.8	0.7	1**
3	3	2320.5	2320.5	0.1	1**
3	3	2325.8	2325.8	0.2	1**
4	6	1423 E		165 D	2
4	3	1806.9	1806.9	0.1	1
4	7	1906		97	2
5	3	1916.5	1916.5	0.1	2
5	3	1919.6	1919.6	0.2	2
6	2	1500.9	1502.8	4.1	1*
6	2	2319	2320	12	1**
7	3	2224.0	2224.0	0.1	1
7	3	2302.3	2302.3	0.1	1**
7	3	2305.4	2305.4	0.2	2**
7	3	2307.6	2308.3	1.2	2**
8	6	1423 E		554 D	1
9	6	1422 E		458 D	1
10	3	1836.0	1837.1	2.0	2
10	3	1842.3	1842.3	0.3	2
10	3	2021.5	2021.5	0.1	1
10	3	2143.7	2143.7	0.2	2
10	7	2229		71 D	2
11	6	1421 E		562 D	2
11	9	2056.0		167 D	3**
12	6	1422 E	1935 U	561 D	2
12	8	1648.9	1651.2	12	3
13	6	1421 E	1957 U	562 D	1
14	6	1421 E	1756 U	564 D	2
15	6	1418 E		567 D	1
16	6	1422 E		565 D	2
16	8	2247	2250.0	6	3
17	6	1421 E		566 D	1
17	2	1910.0	1911.0	1.6	2
18	2	1705.0	1705.6	1.0	2
18	2	1739	1740	7	2
18	3	1757.0	1757.0	0.2	2
18	3	1912.8	1912.8	0.3	2
18	3	2330.2	2330.2	0.2	2**
19	3	1431.6	1431.7	0.8	2*
19	3	1433.8	1433.8	0.1	2*
19	3	1455.8	1455.8	0.3	2
19	3	1640.0	1640.0	0.1	1

Jan. 1960	Type	Start UT	Time of Maximum UT	Duration Minutes	Intensity
19	7	1849		300 D	1
19	9A	1941.0	1946.2	12	2
19	9B	1953	1956.5	8	1
20	2	1432.0	1433.1	2.2	2*
20	3	1802.0	1803.0	1.2	2
20	3	1813.0	1813.0	0.1	1
21	3	1458.0	1458.0	0.1	1*
21	3	1500.2	1500.2	0.1	1*
21	3	1602.0	1602.0	0.2	1
21	3	1739.9	1739.9	0.1	1
21	3	2337.7	2337.7	0.2	1**
22	3	1423.0	1423.0	0.1	1*
22	3	1550.5	1550.5	0.2	2
22	3	1805.4	1805.4	0.2	2
24	3	2003.5	2003.5	0.3	2
26	3	1422.0	1422.2	0.1	1*
26	3	1425.0	1425.0	0.2	1*
26	3	1507.2	1507.2	0.4	1
26	3	1643.9	1643.9	0.6	2
27	2	1417.8	1417.8	3.2	3*
27	3	1428.0	1428.0	0.2	2*
27	3	1504.7	1504.7	0.5	2
27	3	1531.3	1531.3	0.4	1
27	3	1543.0	1543.0	0.8	1
27	3	1805.5	1806.0	0.7	2
27	3	1809.0	1809.0	0.2	2
27	3	1838.5	1839.0	1.2	1
27	3	1852.0	1852.5	1.0	1
27	3	2348.8	2348.9	0.8	2**
28	3	1432.5	1432.5	0.5	2*
28	3	2334.5	2334.5	0.3	2**
29	3	1823.2	1823.2	0.2	2
30	3	1546.0	1546.0	1.0	2
30	3	1640.0	1640.3	0.4	2
30	2	1714	1714.0	7	2
30	3	1723.0	1723.0	0.5	3
30	3	1836.0	1836.0	0.9	1
30	3	2116.6	2116.6	0.4	2
30	3	2201.0	2201.0	0.2	3
30	3	2348.6	2348.6	0.3	1**
31	3	1423.0	1423.0	0.2	1*
31	3	1451.2	1451.2	0.1	2*
31	3	2002.0	2002.0	0.8	2
31	3	2350.9	2351.2	1.6	2**
31	3	2354.1	2355.2	2.8	2**

* On sunrise pattern
** On sunset pattern

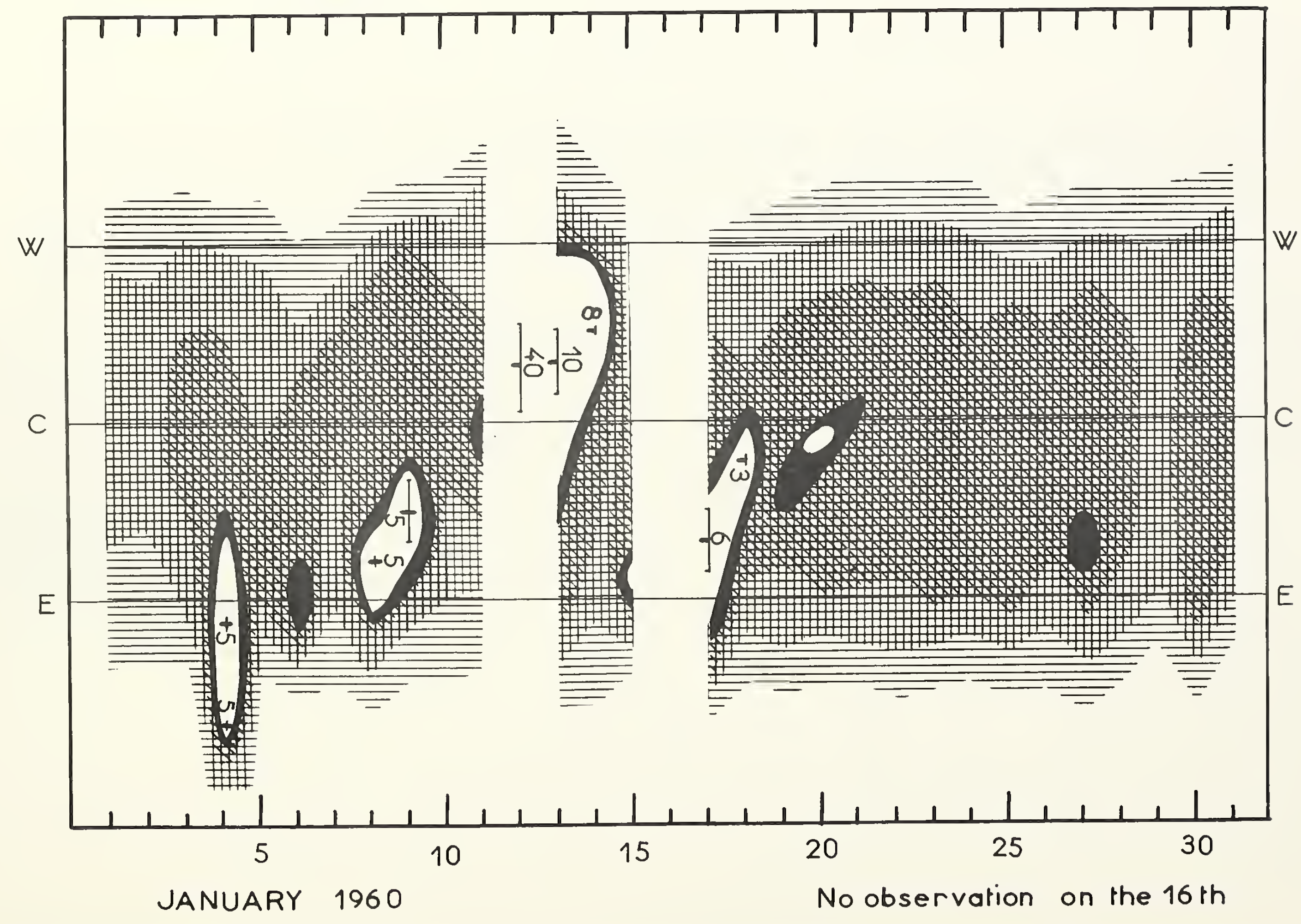
TIMES OF OBSERVATION

Jan. 1960	U.T.	Jan. 1960	
1	1422-2329	16	1422-2347
2	1424-2333	17	1421-2347
3	1424-2334	18	1645-2348
4	1423-2335	19	1419-2349
5	1423-2335	20	1419-2350 I after 1830
6	1422-2337	21	1417-2352 I 1915-2030
7	1423-2337	22	1415-2354
8	1423-2337	23	1416-2356
9	1422-2200	24	1416-2356
10	1730-2340	25	1415-2357 I throughout day
11	1421-2343	26	1415-0000 I throughout day
12	1422-2047	27	1414-0000
	2103-2343	28	1415-0002
13	1421-2343	29	1410-0004 I 1830-0004
14	1421-2345	30	1420-0005 I 1725-1745
15	1418-2345	31	1410-0006

SOLAR RADIO EMISSION
INTERFEROMETRIC OBSERVATIONS

JANUARY 1960

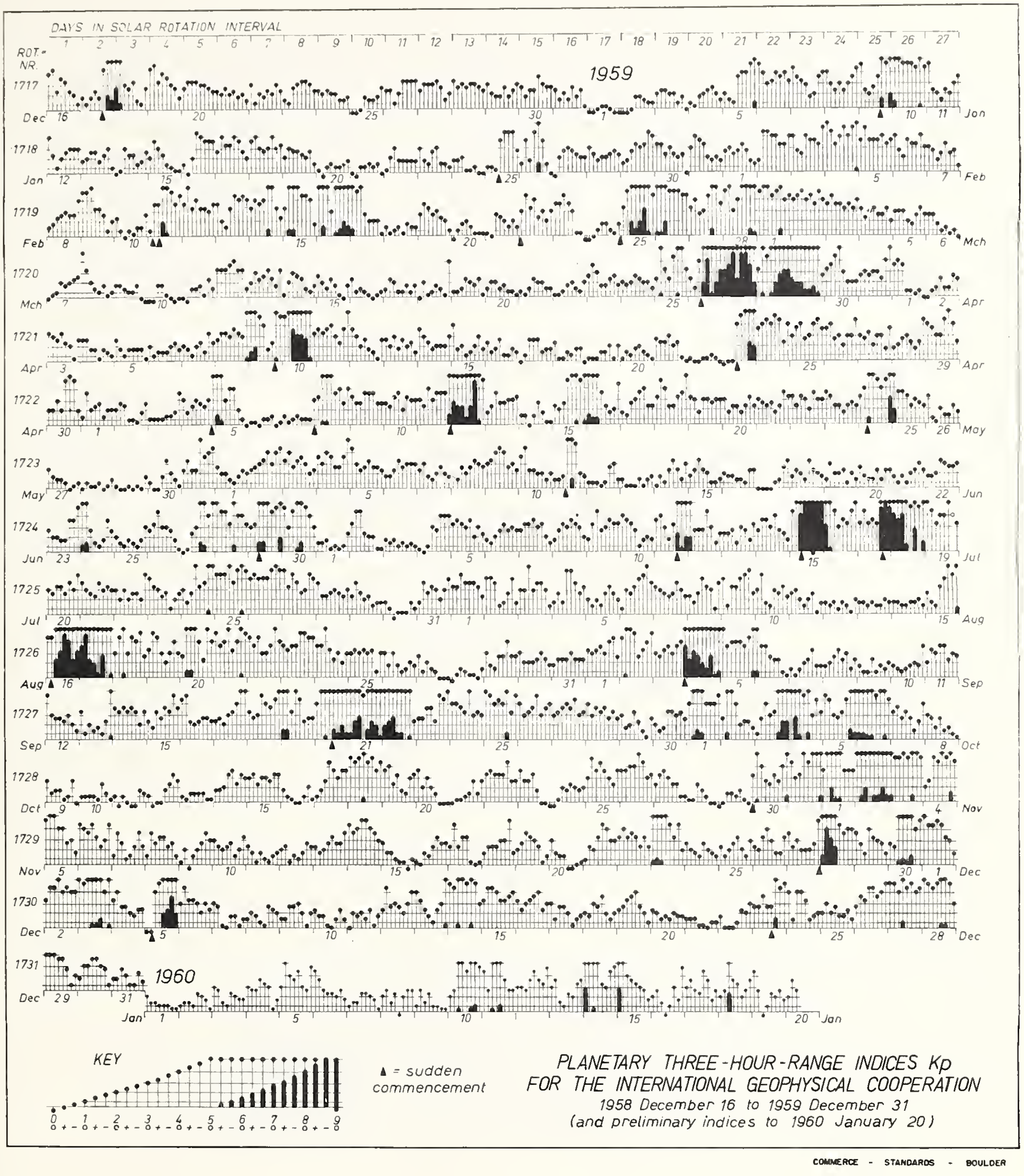
Nançay 169 Mc



GEOMAGNETIC ACTIVITY INDICES

DECEMBER 1959

Dec. 1959	C	Values Kp Three hour Gr. interval 1	2	3	4	5	6	7	8	Sum	Ap	Final Selected Days
1	1.1	5o	4+	4+	5-	4+	3+	3o	2-	31-	28	Five
2	1.2	3+	4+	4+	5o	4o	4+	4o	4o	33+	30	Quiet
3	1.5	5o	5-	5o	5+	5+	6-	4o	5+	40+	50	
4	0.7	3+	4o	3-	3-	2o	2-	2+	2+	21o	12	7
5	1.7	0o	0o	4o	5-	6+	7-	8-	6+	36-	68	10
												11
6	0.9	3o	4+	3+	3+	3o	2o	3o	2+	24+	16	21
7	0.3	3o	3-	1-	0+	2-	2-	1-	1+	12o	6	22
8	0.3	1+	2o	2-	1o	1-	3-	2+	2o	14-	7	
9	0.3	1+	1+	3-	3-	3o	2o	1-	2o	16-	8	
10	0.2	2+	2-	2-	1-	0+	1+	2+	1+	12-	6	
11	0.2	0+	2o	2-	2o	1+	2+	1-	2-	12o	6	Five
12	1.0	2+	4+	3-	3o	3-	2o	3o	4o	24o	16	Disturbed
13	1.1	4o	3+	2+	2-	1o	2+	3o	5+	23o	18	
14	1.4	5-	4+	5+	5o	5-	5+	5-	3o	37o	40	3
15	1.1	3+	4+	4+	4o	3+	3+	4o	4+	31o	26	5
												14
16	1.0	3+	2+	3o	3+	4-	4o	2+	3o	25o	17	27
17	0.3	3o	1+	3-	3-	2o	1-	1+	2-	15+	8	28
18	0.5	2o	2-	3o	3-	4-	2o	1+	2o	18+	10	
19	0.8	2+	3-	3+	4-	4o	3-	2o	1o	22-	14	
20	0.3	2+	2o	1+	2-	1+	2o	2-	2-	14o	6	
21	0.1	1+	1+	1+	1-	1-	0+	1o	1o	8-	4	Ten
22	0.4	2-	0+	0+	0+	1o	2+	2o	3o	11o	6	Quiet
23	1.3	3-	3-	4-	3-	3-	6o	4+	5-	29+	28	7
24	0.9	4o	1+	4o	4o	3+	1+	2-	2o	22-	15	8
25	0.4	2o	3o	2o	3-	2-	2-	2+	1+	17-	8	9
												10
26	1.2	3-	4-	3+	4+	4+	4-	4o	5-	31-	26	11
27	1.4	5-	5-	4o	6-	4+	5-	4o	4+	36+	38	17
28	1.4	5o	5-	4+	5-	5+	5+	5-	3o	37o	40	20
29	0.9	4o	4o	4o	4-	4-	3-	1o	2o	25o	18	21
30	0.8	2-	3o	3o	4-	4-	3o	3-	1o	22-	14	22
31	0.4	2-	2-	3-	2o	1o	1o	2+	1+	14-	7	31
Mean:	0.81									Mean:	19	



PLANETARY THREE-HOUR-RANGE INDICES Kp
FOR THE INTERNATIONAL GEOPHYSICAL COOPERATION
1958 December 16 to 1959 December 31
(and preliminary indices to 1960 January 20)

COMMERCE - STANDARDS - BOULDER

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH ATLANTIC

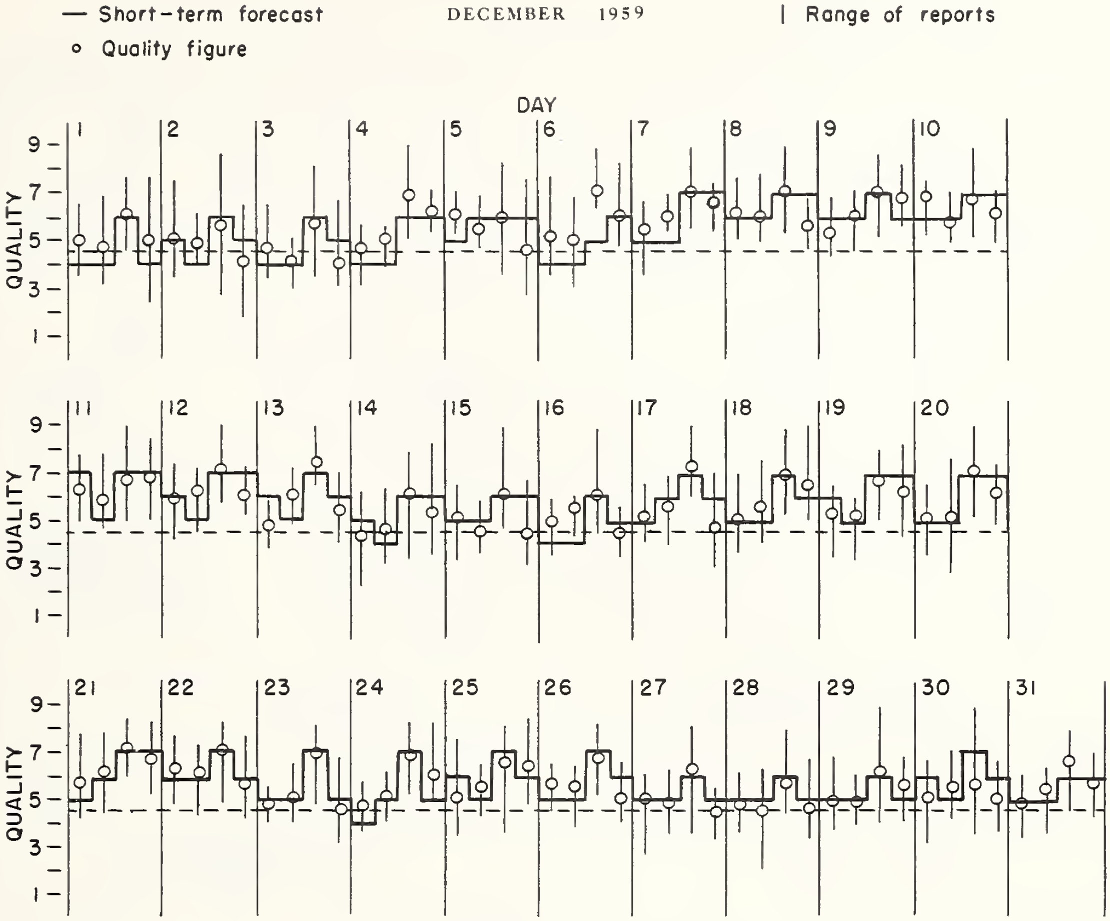
DECEMBER 1959

Dec. 1959	North Atlantic 6-hourly quality figures				Short-term forecasts issued about one hour in advance of:				Whole day index	Advance forecasts (J-reports) for whole day; issued in advance by:				Geomagnetic K_{Fr}	
	00 to 06	06 to 12	12 to 18	18 to 24	00	06	12	18		1-7 days Final	1-7 days Js	1-7 days SDW	1-7 days J	Half (1)	Day (2)
1	5o	5-	6+	5o	4	4	6	4	5+	4			4	(4)	3
2	5+	5o	6-	4o	5	4	6	5	5-	5			5	(4)	(4)
3	5-	4+	6-	4+	4	4	6	5	5-	4			4	(5)	(4)
4	5-	5o	7o	6+	4	4	6	6	6-	5			5	3	1
5	6+	6-	6o	5-	5	6	6	6	6-	5			5	2	(5)
6	5+	5o	7o	6+	4	4	5	6	6o	6			6	3	2
7	6-	6o	7o	7-	5	5	7	7	6+	7			7	1	1
8	6+	6+	7+	6-	6	6	7	7	6+	7			7	1	2
9	5+	6+	7o	7o	6	6	7	6	6+	7			7	2	2
10	7-	6o	7o	6+	6	6	7	7	6+	6			6	1	1
11	6+	6-	7-	7-	7	5	7	7	6+	6			6	1	1
12	6o	6+	7o	6o	6	5	7	7	6+	7			7	3	3
13	5-	6o	7+	5+	6	5	7	6	6o	7			7	3	3
14	4+	5-	6o	5+	5	4	6	6	5o	7			7	3	(4)
15	5+	4+	6+	4+	5	5	6	6	5o	6			6	(4)	3
16	5o	5+	6o	4+	4	4	6	5	5o	6			6	3	2
17	5o	6-	7+	5-	5	6	7	6	6-	6			6	2	1
18	5o	6-	7o	7-	5	5	7	6	6o	6			6	2	2
19	5+	5+	7-	6+	6	5	7	7	6-	6			6	3	1
20	5o	5+	7+	6+	5	5	7	7	6o	5			5	2	1
21	6-	6o	7o	7-	5	6	7	7	6+	5			5	1	1
22	6+	6o	7o	6-	6	6	7	6	6+	6			6	0	1
23	5-	5o	7o	4+	5	5	7	5	5+	6			6	2	(4)
24	5-	5o	7-	6o	4	5	7	5	6-	4			4	3	2
25	5o	6-	7-	6+	6	5	7	6	6o	5			5	2	1
26	6-	6-	7-	5o	5	5	7	6	6-	6			6	(4)	3
27	5o	5o	6+	4+	5	5	6	5	5o	6			6	(4)	(4)
28	5-	4+	6-	5-	5	5	6	5	5-	6			6	(4)	(4)
29	5o	5o	6+	6-	5	5	6	5	6-	6			6	(4)	2
30	5o	6-	6-	5o	6	5	7	6	5+	6			6	3	2
31	5-	5+	7-	6-	5	5	6	6	6-	6			6	2	1
Score: Quiet Periods				P	13	14	27	9		11			11		
				S	17	14	3	16		18			18		
				U	0	0	1	0		1			1		
				F	0	0	0	0		1			1		
Disturbed Periods				P	0	1	0	0		0			0		
				S	1	2	0	5		0			0		
				U	0	0	0	0		0			0		
				F	0	0	0	1		0			0		

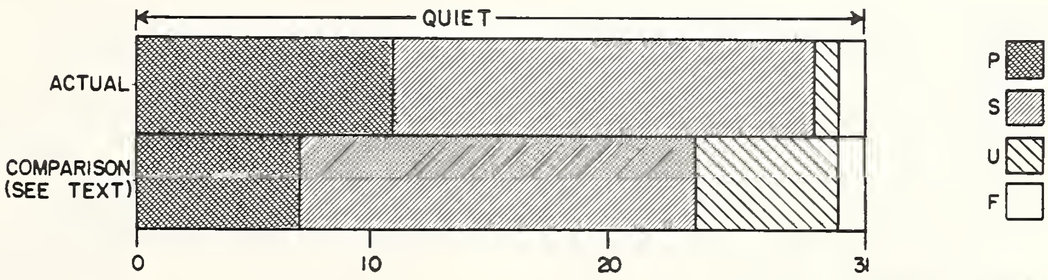
( ) represent disturbed values.

NORTH ATLANTIC

DECEMBER 1959

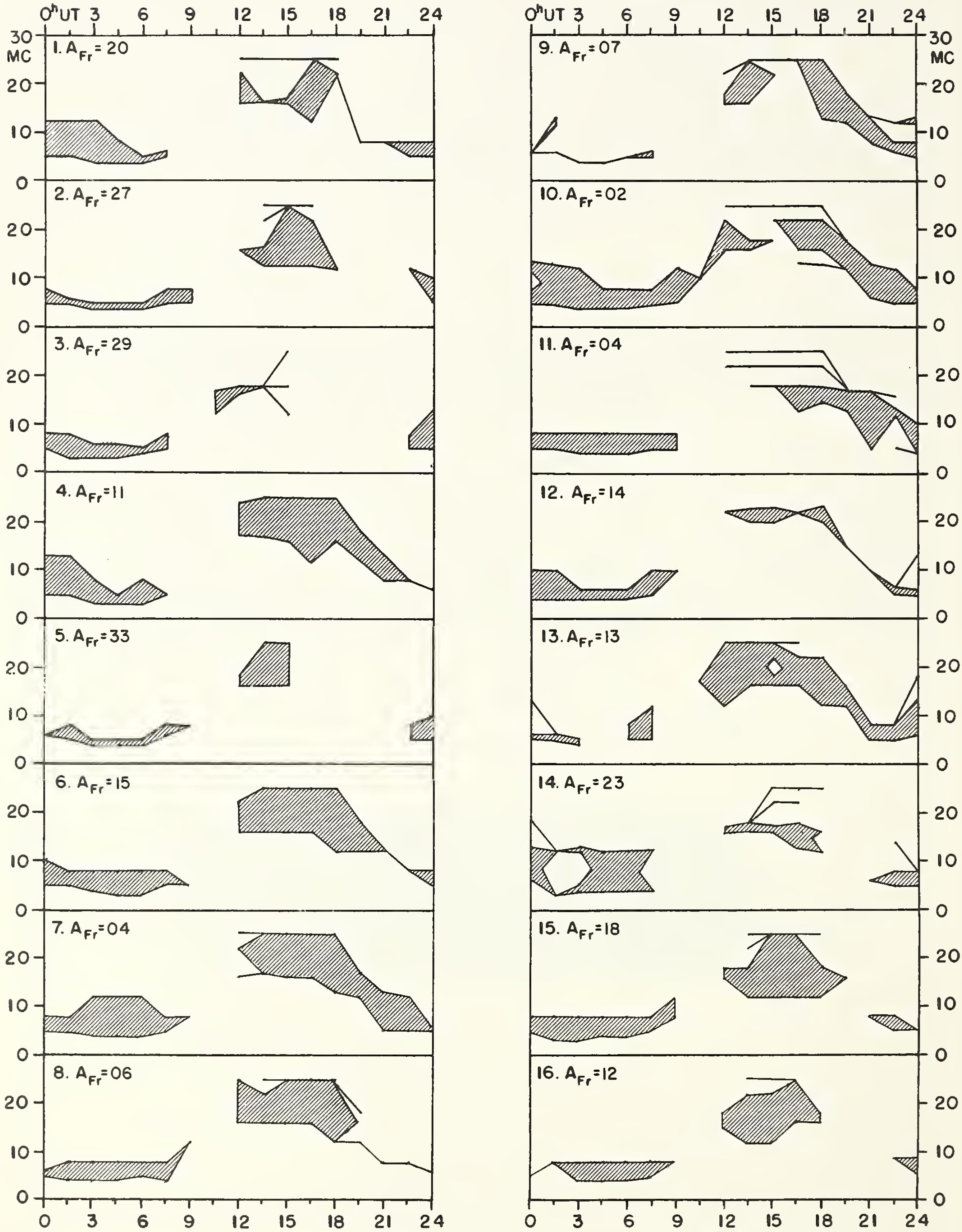


OUTCOME OF ADVANCED FORECASTS FINAL ESTIMATE

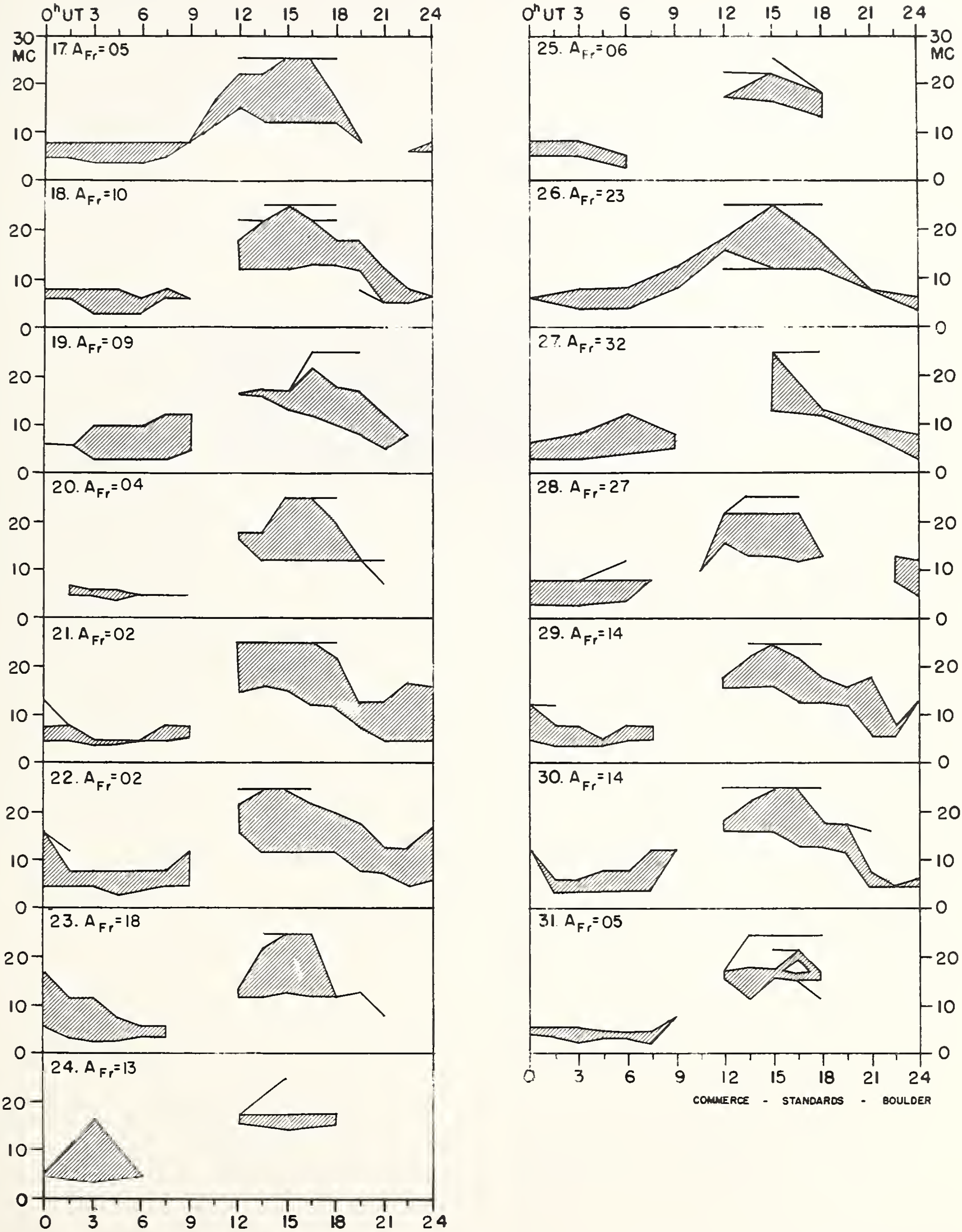


COMMERCE - STANDARDS - BOULDER

DECEMBER 1959



COMMERCE - STANDARDS - BOULDER



Adapted from Observations by Deutsches Bundespost

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

NORTH PACIFIC

DECEMBER 1959

Dec. 1959	North Pacific 12-hourly quality figures		Short-term forecasts issued at		Whole day index	Advance forecasts (Jp reports) for whole day; issued in advance by:				Geomagnetic K_{Si}	
	0700 to 1900	1900 to 0700	0600	1800		1-7 days Final	1-7 days Jps	1-7 days SDW	1-7 days Jp	Half Day (1)	Half Day (2)
1	6	6	4	5	6	4			4	(5)	(4)
2	6	6	4	5	5	5			5	(4)	(4)
3	4	4	5	5	(4)	5			5	(5)	(6)
4	6	5	5	5	5	5			5	3	2
5	3	2	5	5	(2)	6			6	2	(8)
6	6	6	5	6	6	6			6	3	2
7	5	5	6	5	5	6			6	1	2
8	5	6	5	5	5	6			6	1	1
9	6	5	5	6	6	6			6	2	1
10	5	5	5	5	5	5			5	1	1
11	5	4	5	5	5	5			5	1	1
12	7	5	5	5	6	6			6	2	2
13	6	6	5	5	6	6			6	2	2
14	5	5	5	5	(4)	6			6	(5)	(4)
15	5	5	4	5	5	6			6	(4)	(4)
16	5	5	5	5	5	5			5	3	(4)
17	6	6	5	6	6	5			5	2	2
18	7	7	5	6	7	5			5	2	2
19	6	6	5	6	6	6			6	(4)	3
20	6	5	5	6	5	5			5	1	2
21	6	6	5	5	6	5			5	0	0
22	5	6	5	5	6	6			6	0	2
23	5	6	5	5	6	6			6	2	(4)
24	6	5	5	6	6	5			5	(4)	2
25	6	7	5	6	6	6			6	2	2
26	5	6	6	5	6	6			6	(4)	(4)
27	5	5	5	5	5	5			5	(4)	(4)
28	4	5	4	4	(4)	5			5	(4)	(5)
29	5	5	5	5	5	5			5	(4)	3
30	6	6	5	6	6	5			5	2	3
31	6	6	6	6	6	6			6	1	2
Score:	Quiet Periods		P 10	14		18					
			S 14	14		7					
			U 2	0		1					
			F 2	0		1					
	Disturbed Periods		P 1	0		0					
			S 1	2		2					
			U 1	0		0					
			F 0	1		2					

( ) represent disturbed values.

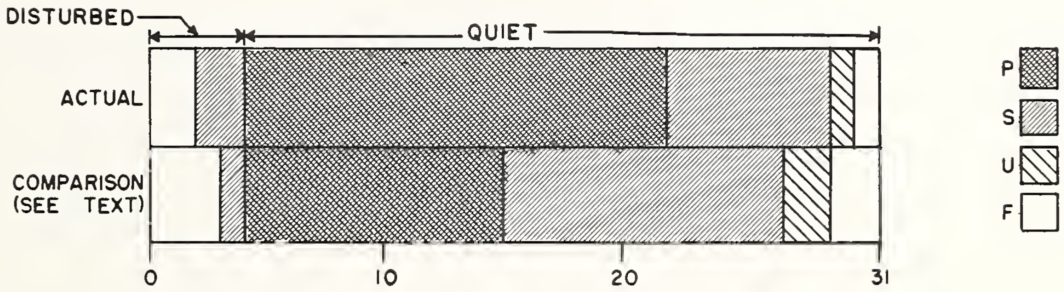
COMMERCE - STANDARDS - BOULDER

Errata: In CRPL-F 185 Part B the score for December 1959 under "Whole day index" should have been under "1-7 days Final".

NORTH PACIFIC

DECEMBER 1959

OUTCOME OF ADVANCED FORECASTS FINAL ESTIMATE



ALERT PERIODS AND SPECIAL WORLD INTERVALS

INTERNATIONAL WORLD DAY SERVICE
JANUARY 1960

Issued Day/Time UT Jan 1960	Advance Geophysical Alert	No.	World-Wide Geophysical Alert	Special World Interval
11/1600		44	Magnetic Storm 10/0719Z	
12/0000	Burbank Solar Flare 11/2140Z			
14/1005	Fort Belvoir Magnetic Storm 13/1900Z			
14/1600		45	Magnetic Storm 13/1900Z	
18/1115	Fort Belvoir Magnetic Storm 17/12XXZ			
18/1600		46	Magnetic Storm 17/1200Z	
21/1600		47	Magnetic Storm 21/00XXZ	

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